

HANDBOOK OF THE BIRDS OF THE WORLD

Volume 4
Sandgrouse
to
Cuckoos



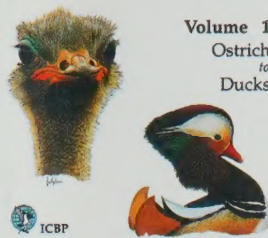

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REVIEWS

When the pre-publication fliers for the first volume in this series appeared in 1992 I was sceptical: who were these people who were producing a series that was going to illustrate and describe every bird in the world? But the series had the backing of the ICBP (now BirdLife International), and as I was based in the United States, the price tag didn't seem too outrageous, so I ordered a copy. What a mistake – spend a few minutes perusing a volume in this series and you're hooked!

Peter Ryan, AFRICA: BIRDS AND BIRDING

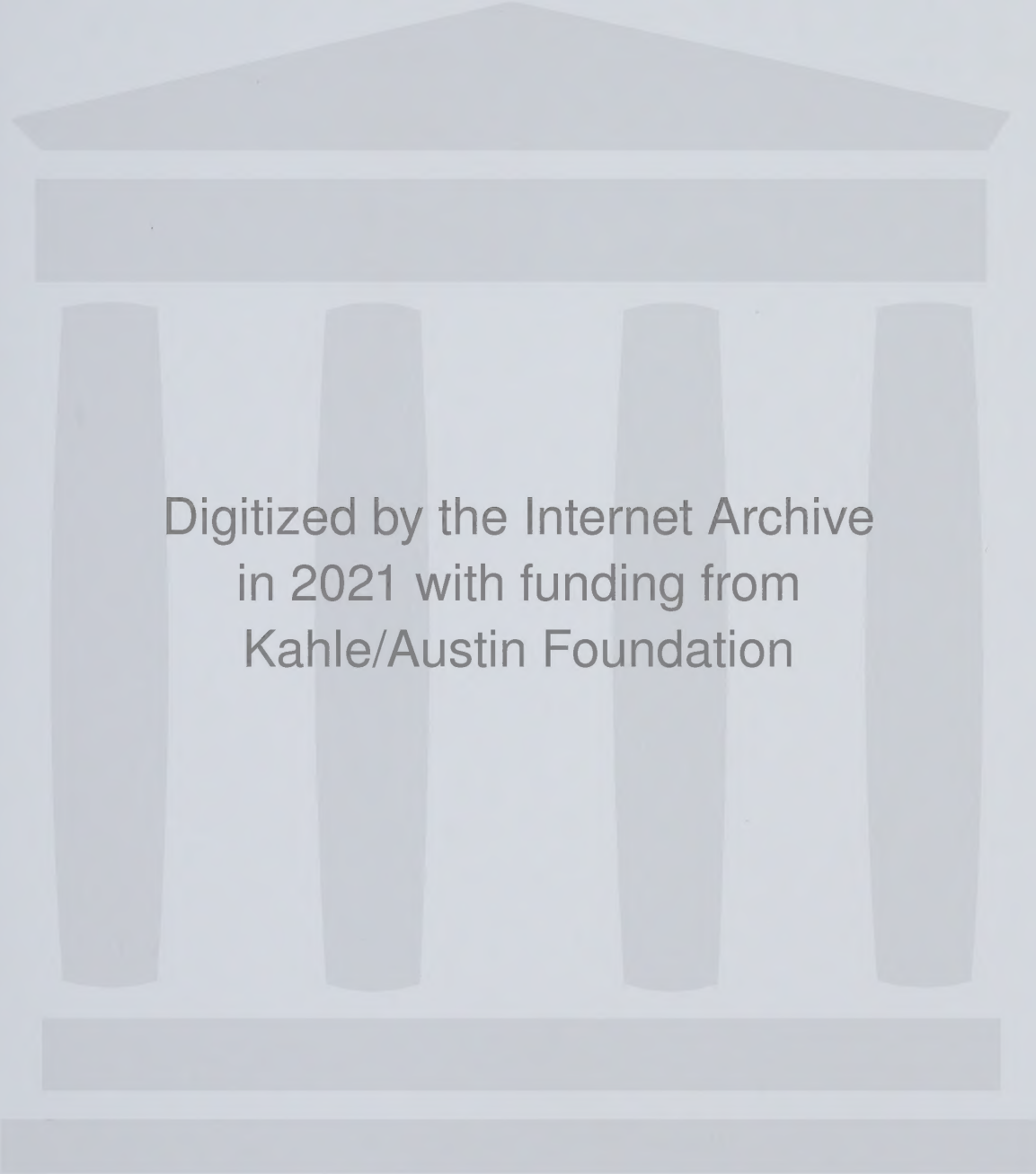
Having seen the scope and effort involved in the production of BWP, and HANZAB (both covering tiny avifaunas compared with HBW), when HBW1 was first announced I dismissed it as a work unlikely to succeed. After all, who would be mad enough to attempt a handbook to *all* the world's birds. After a detailed examination of HBW2, however, I am kicking myself and will certainly be collecting all twelve volumes of this monumental undertaking!

Mark Brazil, NOTORNIS

When I received the first announcements of the publication of a handbook covering all the birds of the world I must admit that I was rather pessimistic... Now, with the first 3 volumes of The Handbook of the Birds of the World available, we can do nothing else than to congratulate the Barcelona team in what they have managed to produce: a splendid series of books, crammed with information and with superb plates, showing even the more poorly known species of the world.

C. S. Roselaar, ARDEA

Jacket illustration by FRANCESC JUTGLAR
Pin-tailed Sandgrouse (*Pterocles alchata*)
Coral-billed Ground-cuckoo (*Carpococcyx renauldi*)



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Sandgrouse *to* Cuckoos



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Sandgrouse *to* Cuckoos

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Species Concepts and Species Limits in Ornithology

The complexities of the “species problem” in biology are due to the gradual nature of the evolutionary process and to the geographical mode of speciation in animals and plants. Under any species concept proposed it is difficult in many cases to draw a definite line in the evolutionary continuum delimiting species taxa, except in the local, “non-dimensional” situation. Biologists have discussed these complexities for over 100 years and continue to discuss them intensively at the present time. Several alternative notions on the general nature of species conceive these units as created entities, as groups of non-intergrading populations at any particular time level, or as phyletic lineages through time. These theoretical species concepts need to be distinguished from the different (wide to narrow) taxonomic delimitation of individual species taxa.

Species concepts and species limits

Under each of the theoretical species concepts zoologists delimited and are delimiting “narrow” or “wide” species taxa (splitters and lumpers, respectively), depending on whether these systematists place the taxonomic species limit at relatively “low” or “high” levels of microtaxonomic differentiation, respectively. A species limit at a fairly high level of differentiation results in relatively few species taxa, each species comprising wide arrays of variously differentiated geographical representatives. On the other hand, a taxonomic species limit at a low level of differentiation results in more numerous, internally rather uniform and narrowly defined species taxa. Zoologists advocating different theoretical species concepts may in practice delimit species taxa in a similar manner. On the other hand, zoologists adhering to the same theoretical species concept may delimit species taxa quite differently.

In a recent survey, Mayden (1997) discussed 22 concepts of species that are in use today. I consider only those few concepts which have been or are being discussed by ornithologists. Most biologists of the nineteenth century applied a typological species concept, labelling as species any sample of organisms that was morphologically “different”. Morphology was used to recognize species taxa that correspond to the typological species concept. During this present century, the majority of biologists have favoured the biological species concept and a placement of species limits at intermediate levels of microtaxonomic differentiation. However, this consensus has been challenged by other proposals during the last 15 years.

1) Typological Species Concept

Organic diversity is assumed to reflect the expression of underlying “types”, and the observed variation is seen as the result of different manifestations of these “types”. This concept is based on typological essentialism. This was the theoretical species

concept of most pre-Darwinian zoologists and of some ornithologists during the late nineteenth and early twentieth centuries. They delimited species taxa following widely varying standards, applying broad to narrow species limits. This concept is basically non-evolutionary, as "type" are believed possible, but no branching evolution leading to the origin of new species. Creationists assume, or assumed, that many or most species (their basic types or their "primordial germs") have been created independently.

2) Biological Species Concept

After Darwin's *Origin of Species* (1859), the species concept was part of evolutionary theory. This biological species concept (BSC) as elaborated on by Mayr (1942, 1963, 1997) applies only to sexually reproducing organisms and it is truly valid only in local ("non-dimensional") situations, where species are sympatric. Such species are genetically, reproductively and ecologically separated units, each occupying a species-specific niche in nature (Mayr 1969, 1982; Bock 1986, 1995). Their genetic-reproductive isolation prevents effective interbreeding and merging.

It is the multidimensional species in taxonomy, with its extensions over space and time, which applies to most real units observed in nature, the species taxa (Fig. 1), and these are subject to all the difficulties of any pragmatic application of theoretical concepts (Mayr 1963, 1982; Bock 1979, 1986). The distinctiveness of species becomes increasingly vague as one progresses geographically and chronologically further and further away from a single point where two species occur in sympatry or parapatry, since: "*Species are groups of actually (or potentially) interbreeding populations that are reproductively isolated in nature from other such groups*" (Mayr 1942, 1963, 1969). Reproductive isolation is understood to mean genetic isolation, and as Mayr (1968: 164) stated: the "possession of a shared genetic program is the common tie uniting individuals derived from the same gene pool of a given species."

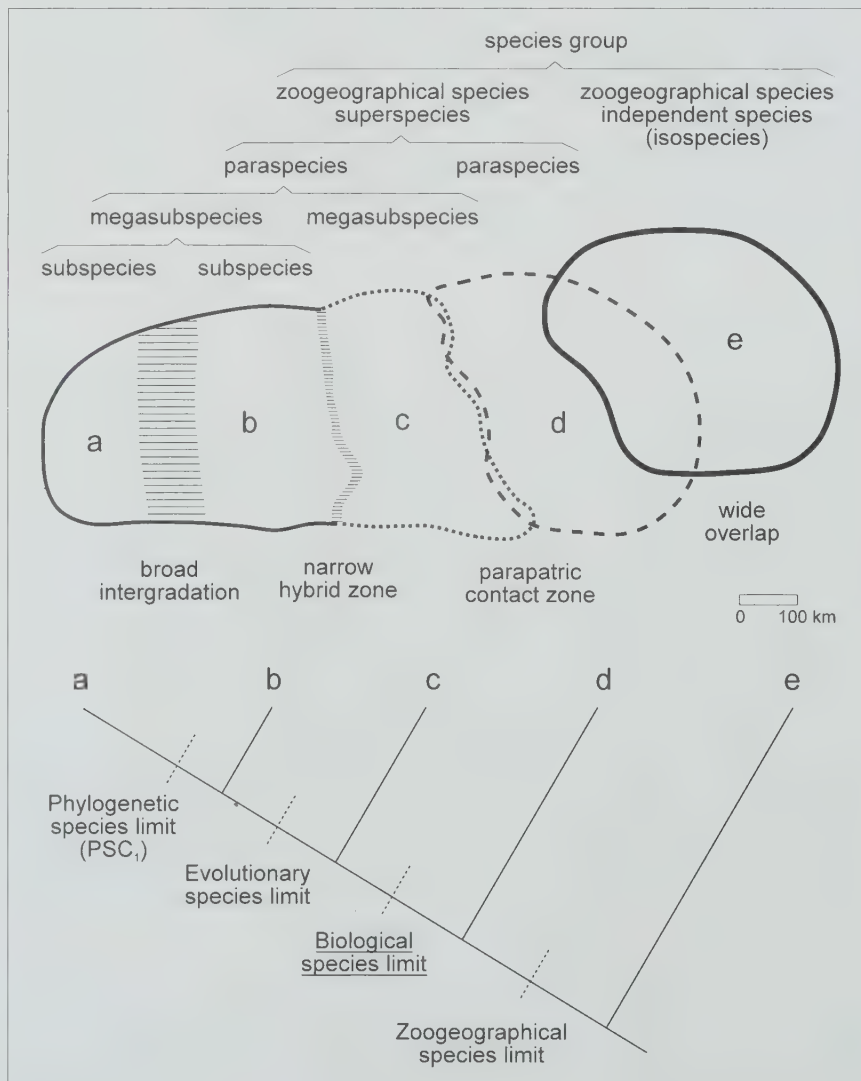


Fig. 1. Species limits under different species concepts. In this schematic representation of an imaginary field situation, increased genetic-reproductive isolation between geographical forms along their contact zone (upper part) coincides with increasingly distant genealogical relationships (lower part). Interrelationships of representative taxa along parapatric contact zones may be narrow range overlap or geographical exclusion, in both cases with or without restricted hybridization. Names of microtaxonomic categories under the biological species concept are indicated above the schematic outline of distribution areas. In this example, 5, 4, 3 or 2 taxonomic species are recognized depending on which species concept is applied and where the corresponding species limit is placed. Slightly modified from Haffer (1986).

Bock (1986, 1992) made this explicit by emending the definition of biospecies to read: "a species is a group of actually or potentially interbreeding populations which are genetically isolated in nature from other such groups." However, reproductive isolation between many biological species is not complete and, therefore, does not prevent hybridization at a low level in these cases (Mayr 1970, 1982; Grant & Grant 1992; Grant 1993). The view of species as "genetic clusters" (Mallet 1995) also represents the transcribed definition of biological species.

In Table 1, I schematically subdivided the process of microtaxonomic differentiation into 6 stages that are here listed from bottom to top in a presumed temporal sequence of gradually increasing differentiation (see also Fig. 1). However, not every differentiating taxon necessarily passes through each of these stages. In this table, aspects of behavioural differentiation between closely related forms are subsumed under "genetic isolation" (e.g. differing calls or songs) and/or "ecological separation" (e.g. different feeding behaviour). Table 1 is an attempt at visualizing the process of microtaxonomic differentiation through a schematic grid of increasing levels of morphological, genetic-reproductive and ecological differentiation. This grid and, in particular, the sharp boundaries of the various stages (microtaxonomic categories) are rather crude means of illustrating schematically the results of the differentiation process. Nature is not necessarily orderly, and extant faunas provide many examples of taxa at transitional stages between the categories distinguished here or of taxa which combine aspects of two categories in different areas of contact; for instance, two particular taxa may hybridize with each other in one of their areas of contact or overlap but not in another. "Ring species" represent other borderline cases, where two taxa that do not hybridize in a particular region are geographically interconnected by a continuous "ring" of intergrading subspecies. Morphological differences may or may not render a group of populations diagnosable taxonomically at an early stage of genetic differentiation (subspecies). However, stages in continuous character clines are not diagnosable and should not be designated as subspecies; only the end points of such clines qualify as such.

In many bird populations, genetic isolation may be completed before ecological segregation from the nearest relative is reached. This situation leads to geographical replacement (parapatry) of these forms (biospecies) with no or only limited hybridization along their contact zone (Fig. 1, Table 1). The frequent occurrence of superspecies in the avifaunas of the world (Bock & Farrand 1980; Sibley & Monroe 1990) indicates that ecological competition often prevents sympatry of geographical representatives long after speciation is complete (Lack 1944; Mayr 1963). Many species probably perfected ecological segregation and certain aspects of reproductive isolation in neosympatry. However, genetic isolation must evolve fully in the initial allopatric period of speciation (Bock 1979, 1986; Grant 1986). The process of speciation has terminated only after the differentiating taxa have attained genetic-reproductive isolation and ecological separation, leading to sympatry of the species.

Under the biological species concept, most authors currently place the species limit at "intermediate" level III (Table 1), as discussed by Short (1969, 1972), who

Table 1. Components of microtaxonomic differentiation. Taxa at various stages of increased modification are assigned to collective taxonomic categories listed at right and here named under the biological species concept. Dashed lines indicate the position of the species limit under different species concepts as follows: narrow (diagnosable) version of the phylogenetic species concept (I, II); biological species concept and broad (monophyly) version of the phylogenetic species concept (if species is monophyletic) (III); recognition concept (IV); and biogeographical species concept (V). From Haffer (1992).

Stages in the differentiation process		Relations between taxa along contact zone	TAXA				Taxonomic categories	
			Morphological differentiation	Genetic isolation	Reproductive isolation	Ecological separation		
6	HYBRIDIZATION / PARAPATRY	SYMPATRY	(+)	(+)	(+)	(+)	Synspecies	
5		COMPETITION PARAPATRY	(+)	(+)	(+)	—	Paraspecies	
4		HYBRIDIZATION PARAPATRY OVERLAP & HYBRIDIZATION PARAPATRIC HYBRIDIZATION	(+)	(+)	—	—	Semispecies	
3			NARROW HYBRID ZONE	(+)	—	—	—	Megasubspecies
2			WIDE HYBRID ZONE	(+)	—	—	—	Subspecies
1		CLINAL VARIATION	—	—	—	—		
(+) , Present; —, absent								

(+), Present; —, absent

also indicated the amount of hybridization acceptable between biological species (see also Amadon & Short 1992). Other authors place the species limit at slightly higher or lower levels, thus delimiting species taxa more widely or more narrowly, respectively. For example, adherents to Paterson's (1985) recognition concept of species place the species limit at level IV. Representative taxa, especially of insects, that hybridize freely along a contact zone (because of the lack of pre-mating isolating mechanisms), but in which cases all or almost all hybrids are infertile (because of fully developed postmating isolating mechanisms) are considered as subspecies under the recognition concept, but are species under the biospecies concept. Some bird species which meet along "zones of overlap and hybridization" (Short 1969) may also represent taxa which are genetically isolated but not fully reproductively isolated in a strict sense.

On continents, the intergradation of contiguous populations or their geographical exclusion with no (or only restricted) hybridization along the contact zone determine their rank as subspecies or species, respectively. The amount of hybridization determining the "exact" limit of the species and subspecies categories is arbitrary. Geographically separated (allopatric) taxa on islands in the ocean or on ecological "islands" on continents are assigned subspecies or species status on the basis of inference, for instance through a comparison with the degree of difference between related sympatric species, the degree of difference between intergrading subspecies within widespread species, or the degree of difference between hybridizing populations in related species (Mayr 1969: 197, Mayr & Ashlock 1991: 104-105). The delimitation of polytypic species taxa uses morphological, geographical, ecological, behavioural and molecular information to infer the rank of isolated populations (Mayr 1996). This procedure presents no conceptual problems, because speciation requires geographical isolation of populations for the differentiation process to proceed. Therefore difficulties of judging the status of allopatric populations as subspecies or species and the existence of intermediate stages between subspecies and species (a "grey zone") are to be expected. Admittedly, some authors (splitters) emphasize the differences among allopatric forms at intermediate stages of differentiation and treat them as species, whereas others (lumpers) tend to emphasize the similarities between these same forms and consider them conspecific.

The "horizontal" concept of species taxa refers to genetically isolated communities of a particular time level (comprising a small number of generations), such as the Recent period or any other time level of the geological history of the earth (Peters 1970; Bock 1979, 1986). The vertical extent ("thickness") of such a geological time level ("slice"), or in other words the "duration" of a species taxon, is a matter of convention and, in most cases, will be determined by the incompleteness of the fossil record.

The distribution patterns of groups of closely related and geographically representative biospecies on continents in many cases resemble large scale mosaics composed of neatly interlocking patches formed by the ranges of the component species (Figs. 1 and 3-4). Two or more such species are combined in a superspecies if they "were once races of a single species but have now achieved species status" (Amadon 1966). In some groups of animals geographical exclusion (parapatry) probably persists long after the representative taxa have attained genetic isolation, and not only one but two or more periods of successive speciation events have occurred (Haffer 1986). The members of a superspecies are in most cases each others' closest relatives, because of a basically consistent association between morphological character evolution, genetic-reproductive isolation and ecological differentiation. However, detailed cladistic analyses may reveal that this is not true in some cases when one of the members of a superspecies is the sister taxon of another widely sympatric species. It remains to be determined how frequent such situations actually are.

Several entomologists (Jordan, Poulton) and ornithologists (e.g. Seebohm, Coues) developed the ideas of biological species during the late nineteenth century, although their origin is much older. These ideas were elaborated on and increasingly applied by ornithologists during the present century in Europe (Hartert, Stresemann, Rensch) and in North America (Chapman, Grinnell, Miller and especially Mayr).

3) Evolutionary and Phylogenetic "Species" Concepts (The Phyletic Lineage)

Paleontologists, beginning with Simpson (1951, 1961), defined species as follows: "*An evolutionary species is a lineage (an ancestral-descendent sequence of populations) evolving separately from others and with its own unitary evolutionary role and tendencies.*" Wiley (1981) emended the wording of this definition somewhat. Under this concept, species limits may or may not coincide with speciation events (i.e. branching of lineages), and every geographical isolate has to be treated as a species. Other difficulties refer to the definitions of "evolutionary tendency" and

“historical fate”, as well as to the determination of species limits along evolving phyletic lineages (Mayr 1996). Most phylogenetic systematists (cladists) consider a species as a phyletic lineage between two successive speciation (branching) events or until the lineage terminates. Character change may or may not occur in the two daughter species.

These concepts view species as phyletic lineages through time. However, a “vertical” lineage represents an evolutionary phenomenon quite different from the notion of the “horizontal” biological species discussed above. The phyletic lineage is the continuum of a species as its members reproduce generation after generation through time. The phenotypic characteristics of the members of a phylogenetic lineage, and hence the underlying genetic bases, may remain the same over long geological periods (stasis) or change more or less gradually through time (phyletic evolution). As Bock (1986: 38) and Szalay & Bock (1991: 15) have stated, “a cross-section of a phyletic lineage at any point in time is a species (theoretical, non-dimensional). However, different time slices through the same phyletic lineage are not different species, nor are they the same species. They are simply different cross-sections of the lineage at different times, with the earlier one being ancestral to the later one. Each time slice is a species, but it makes no sense to ask whether they are the same or different species; the question lies outside the theoretical, non-dimensional species concept and hence, from a theoretical perspective, is a non-question.”

In this sense a species has no origin, lifespan or age. Of course, all phyletic lineages need to be studied in detail as they are important entities of the evolutionary history of a group of animals but, in contrast to species, they are not involved in the processes of evolution (i.e. phyletic evolution and speciation), which take place in living populations.

Species taxa under *Phylogenetic species concepts* (PSC's) include several basal taxonomic units or only one basal unit. Accordingly, species limits range from (a) fairly wide to (b) intermediate and (c) narrow.

(a) Hennig (1966) and many other cladists (e.g. Willmann 1985) delimit extant species rather broadly, like multidimensional species taxa under the biological species concept (*Hennigian species concept* of Mayden 1997). They consider it inappropriate to enquire whether species are monophyletic, paraphyletic or polyphyletic, stating that these terms apply only to groups of species. Under this concept, the principles of cladistic analysis apply only when reticulation within a species gives way to the splitting of one species lineage into two new species (phylogenetic relations).

(b) Other cladists disagree and apply cladistic methods to historical units also at lower (i.e. intraspecific) levels of differentiation, as far as this is possible in view of reticulating genealogical relationships between interbreeding individuals. These cladists combine hybridizing forms as subspecies in one species taxon if and only if the resulting unit is monophyletic (monophyly *sensu* Hennig); paraphyletic entities are not accepted as species (*monophyly version*, PSC 2, of the phylogenetic species concept; Mayden 1997). Under this concept, organisms are first analysed cladistically, and isolated basal taxa and monophyletic groups of basal taxa are subsequently ranked as monotypic species or polytypic (monophyletic) species, respectively (Mishler & Brandon 1987). This concept leads to intermediate species limits.

(c) Cladists applying narrow species limits assign species status to any population that is morphologically diagnosable (levels I or II in Table 1). Under this *diagnosable version*, PSC 1, of the phylogenetic species concept (Mayden 1997) many subspecies are ranked as “species”, unless they are merely stages in a continuous cline; and biospecies *Homo sapiens* is presumably again split into several phylogenetic “species”, as was done 200 years ago. Of the previously named subspecies of animals, only those that are “diagnosably” distinct are considered phylogenetic species. However, the limits of diagnosability, and therefore the decision as to which of the subspecies are accepted as “phylospecies”, are determined subjectively, as Snow (1997) discussed for the Eurasian Blackbird (*Turdus merula* group) and the Coal Tit (*Parus ater*) of Eurasia.

The concept of narrow phylogenetic species (Cracraft 1983; Zink & McKittrick 1995; Zink 1996, 1997) was proposed under a general cladistic framework; however, the definition does not specifically refer to “species” as lineages. Under this concept, no attempt is made to express taxonomically the hierarchy of increasingly differentiated geographical representatives (Fig. 1), which are all designated uniformly as “species” regardless of whether one is dealing with rather weakly differentiated taxa connected by zones of hybridization (subspecies under the BSC), with (\pm) non-hybridizing geographical representatives (paraspecies or allospecies), or with independent taxa with no close relatives (isospecies; Amadon & Short 1992). The term “phylogenetic species” subsumes taxa of conspicuously varying biological differentiation from those at early stages of speciation to taxa that have reached phylogenetic independence. Another problem under PSC 1 is that the number of species taxa rec-

ognized is a matter of the resolving power of the analytical tools available (Avice & Ball 1990); therefore species limits are highly subjective. Numerous small populations or even groups of individuals may be "diagnosable" with improved laboratory techniques and would thus qualify as "species". Moreover, PSC 1 can divide up organisms into overlapping and incompatible species, depending on which characters are picked to be diagnostic (Hull 1997). The difficulties in assessing many subspecies of polytypic biospecies are well known, but this is not very important, because it refers to intraspecific units. On the other hand, this problem is acute under PSC 1, where the decision affects the recognition or non-recognition of species. This difficulty "will make application of PSC 1 hard to achieve with any hope of a consensus or of stability" (Snow 1997: 113). Such difficulties are particularly apparent in many groups of tropical birds in which distribution and geographical variation are incompletely known.

Cladists applying concepts PSC 1 and PSC 2 interpret the capability to hybridize as a plesiomorphic (primitive) character and therefore phylogenetically uninformative. They are concerned that paraphyletic and polyphyletic groups may be ranked as species, if wide species limits are applied without prior cladistic analyses having been carried out. It is not possible to judge how serious this problem is as long as the numbers of paraphyletic and monophyletic biospecies of birds remain unknown. Snow (1997: 116) gained the strong impression that the great majority of polytypic biospecies in Eurasia would be shown by detailed cladistic analyses to be monophyletic. However, there are certainly also numerous biological species taxa in this and other regions of the world that are paraphyletic, as discussed below.

A biological species taxon becomes paraphyletic when a daughter species is originated through "budding" (Fig. 2); for example, a derivative population of a widespread mainland species may have reached species status on a nearby island. However, this speciation event had no effect on the parental biospecies (no. 3, Fig. 2) on the mainland from which neospecies 4 has budded off. The mainland species (no. 3) is real in the sense that it represents a biological unit characterized by close genetic-reproductive and ecological relations among its component subspecies taxa, even though it represents a "non-historical" (paraphyletic) group from a cladistic point of view. Traditionally, such biological clusters have been designated as "species". Cladists who favour the narrow version (PSC 1) of the phylogenetic species concept would consider each of the 9 lineages illustrated in Fig. 2 as "species", regardless of their forming 4 separate clusters through genetic cohesion and intergradation. Cladists applying the monophyly version (PSC 2) of the phylogenetic species concept would recognize monophyletic species 1 and 2 but would dissolve paraphyletic species 3 into three separate species. I emphasize that the cladistic analyses schematically illustrated in Fig. 2 (if feasible at that infraspecific level) yield relevant phylogenetic ("vertical") and biogeographical data on the origin and differentiation of the various groups and their component taxa. Classification of the taxa as subspecies or species is a separate matter.

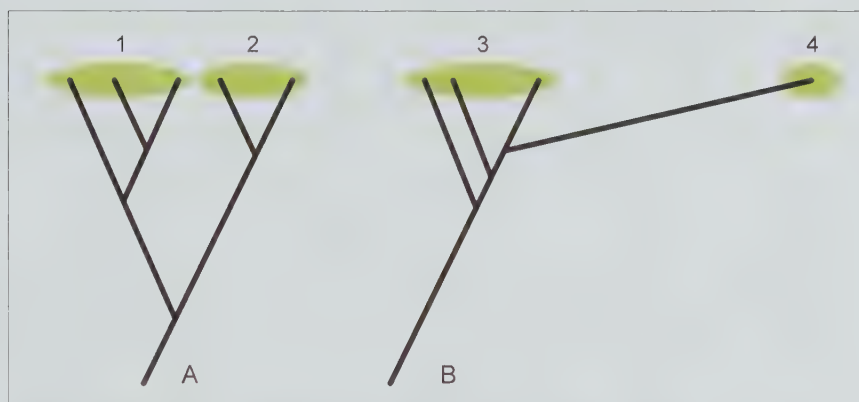
It would be an important task to analyse the bird species of the world from a cladistic point of view and to determine approximately what percentage of bird species are monophyletic entities and how many biospecies are paraphyletic or polyphyletic taxa. It is true that some authors went too far when, early during this century, they combined morphospecies as subspecies into broadly delimited biological (multidimensional) species taxa. This is now being remedied by detailed analyses of such broadly delimited biospecies. However, I would discourage the procedure followed by some modern authors (e.g. Hazevoet 1995), who, on the basis of PSC 1, fall to the opposite extreme and elevate many subspecies on islands and on continents to species status without any cladistic or evolutionary analysis and discussion of grouping and ranking criteria for the isolated basal taxa and monophyletic groups. Moreover, the decision as to which subspecies are elevated to species status is determined subjectively, as explained above. This would be a return to the situation over 100 years ago when many ornithologists applied species names to any population that was morphologically "different".

It is obvious from this discussion that "phylogenetic species" as lineages have been delimited and are being delimited taxonomically following standards that are as different as (or even more different than) under the other main species concepts. Not one but several theoretical notions are subsumed under the name of the "phylogenetic species concept".

Three examples of tropical birds

Within each of the three groups of birds discussed below, ornithologists recognize a different number of species depending on the particular species concept they apply. The birds in each group remain the same but their classification differs according to

Fig. 2. Speciation through splitting (A) and budding (B) resulting in monophyletic biospecies 1 and 2 (consisting of 3 and 2 subspecies, respectively) and paraphyletic biospecies 3 (3 subspecies). Species 4 which budded off from species 3 is monotypic and may demonstrate its species status by occurring sympatrically with some or all subspecies of species 3. Shading indicates genetic cohesion and intergradation of subspecies along contact zones. From Haffer (1992).



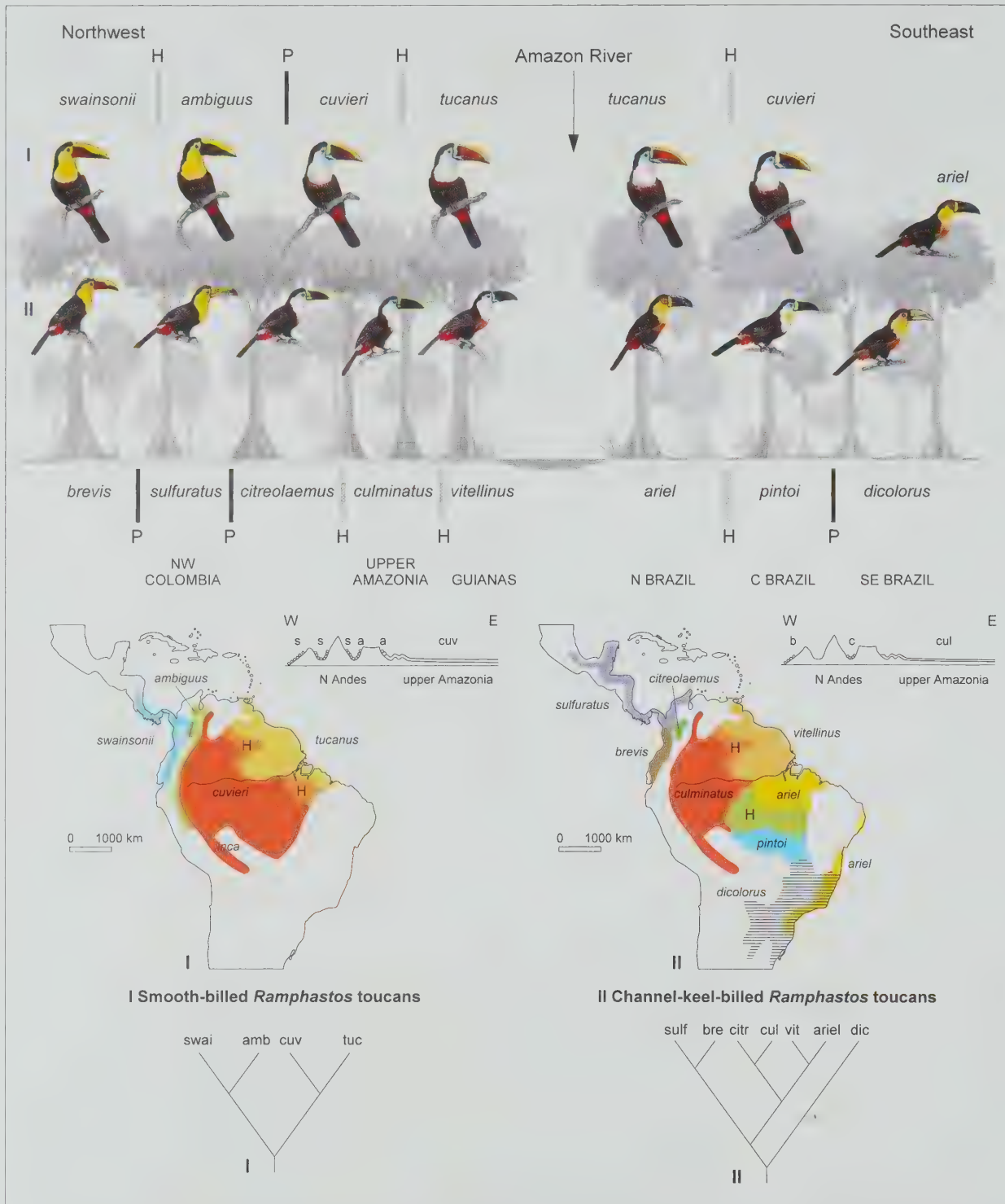
the theoretical ideas of ornithologists as to what constitutes species and subspecies. I have chosen for discussion groups of birds whose distribution and geographical variation are fairly well known and that are composed of rather well marked forms, in order to illustrate clearly the differences in interpretation under different species concepts. Application of the narrow PSC 1 to many poorly known groups of tropical birds would be much more difficult than in the examples chosen.

1) *Ramphastos* toucans in Amazonia (Fig. 3).

The plumage of these toucans is mainly black, while the uppertail-coverts are red, yellow or white; other differences among the various forms refer to the colour of the throat and breast, the tail, the iris and the bill. Two distinct and widely sympatric species groups form mosaic distribution patterns over almost the entire Neotropical Region. These assemblages are composed of: (a) large, smooth-billed species with yelping calls (*R. tucanus* group); and (b) medium-sized channel- or keel-billed species which have croaking vocalizations (*R. vitellinus* group). The larger species inhabit the canopy level of rain forest, whereas the smaller toucans live mostly at middle levels in the forest. The latter are also more insectivorous than their larger relatives, and are seen occasionally at ant raids near the forest floor. Some of the geographical representatives of each group hybridize along their zones of contact, whereas others have reached the species level replacing each other geographically without hybridization. The latter species are probably still too similar ecologically to be able to co-exist in the same forest. Each of the two groups of *Ramphastos* toucans is represented in upper Amazonia by one form (*cuvieri* and *culminatus*, respectively), the smaller toucans by two in lower Amazonia (*vitellinus* and *ariel*) and the larger ones by one form only (*tucanus*). Similarly, in the rain forests west of the Andes there are more forms of the smaller group (three) than of the larger toucans (two). *Ramphastos toco*, a large species with a keeled bill that inhabits mosaics of forest and savanna, is not included in this discussion.

The phylogenetic relations of the taxa included in the *R. vitellinus* group indicate that an early west-east separation of upper and lower Amazonian forms preceded the later differentiation of extant forms *citreolaemus/culminatus* in the west and *vitellinus/ariel* in lower Amazonia to the east. *R. dicolorus* and the two trans-Andean species originated from stocks that separated prior to the differentiation of the Amazonian forms. The upper and lower Amazonian forms of the large smooth-billed species *R. tucanus* also document a separation of a western from an eastern population in Amazonia that later re-established contact forming an extensive hybrid belt similar to that found in the smaller channel-billed toucans. The eastern Amazonian forms *vitellinus* and *ariel* are separated from each other by the broad lower Amazon River. They are sister taxa and would certainly hybridize with each other if they could meet without an intervening barrier zone (both hybridize with the western Amazonian *culminatus*). All the Amazonian forms represent historical entities that probably originated in formerly isolated "refuge" areas during periods of altered distribution of forest and non-forest vegetation, subsequently establishing zones of secondary contact during expansive phases (Haffer 1974).

All Amazonian representatives of both groups would be ranked as species under the diagnosable version (PSC 1) of the phylogenetic species concept, whereas they are combined as subspecies of one species of yelping toucans and one species of grunting toucans under the biological species concept, because they hybridize extensively or would do so if in direct contact: thus *cuvieri* and *tucanus* are combined as biospecies *R. tucanus*; similarly the forms *vitellinus*, *ariel* and *culminatus*, plus the trans-Andean *citreolaemus*, form biospecies *R. vitellinus*. The cladogram of *R. vitellinus* (Fig. 3) indicates that this biospecies is monophyletic (Haffer 1985, Prum 1988). The trans-Andean forms *sulfuratus* and *brevis* do not hybridize where they meet in north-



western Colombia, and they probably began to differentiate somewhat earlier than the Amazonian subspecies of *R. vitellinus*. This last species is also parapatric with *R. sulfuratus*. The latter species and *brevis* are considered as specifically distinct under both versions of the phylogenetic species concept as well as under the biological species concept and the Hennigian concept. The taxonomic classification of basal taxa under the BSC emphasizes the distinction between hybridizing (or potentially hybridizing) taxa (= subspecies) and non-hybridizing sympatric or parapatric taxa (= species). The classification of the Amazonian forms under the monophyly version of the PSC would coincide with that under the BSC, because biospecies *R. vitellinus* and *R. tucanus* are monophyletic. On the other hand, the distinction between hybridizing and non-hybridizing forms is dismissed under PSC 1, and all forms are ranked as species. Under this concept, broadly hybridizing forms (e.g. *culminatus/vitellinus* and *cuvieri/tucanus*) that treat each other in life as biologically “the same unit” are sepa-

Fig. 3. Ecological occurrence and distribution of the *Ramphastos* toucans. I Smooth-billed “yelping” toucans (*R. tucanus* group); II channel-keel-billed “grunting” toucans (*R. vitellinus* group). Relations of taxa along contact zones: P parapatry; H hybridization. Abbreviations along schematic profiles across northern Andes: s *swainsonii*; a *ambiguus*; cuv *cuvieri*; b *brevis*; c *citreolaemus*; cul *culminatus*. Phylogenetic relations of forms in the two groups as discussed by Haffer (1974, 1985) are schematically illustrated below.

[Figure: J. Haffer, T. Llobet, X. Ruiz]

rated as “species” like two widely sympatric and unrelated toucans. Moreover, the large *Ramphastos* populations forming the vast hybrid belts in Amazonia can not be assigned to particular species taxa under the PSC 1, whereas under the BSC and PSC 2 they belong to *R. tucanus* and *R. vitellinus*, respectively. The ‘hybrid’ populations consists exclusively of intermediate and highly variable (hybrid) individuals; parental phenotypes are lacking in the broad central portions of these hybrid zones.

It is true that, under the BSC, the often conspicuous geographical and historical variation at the subspecific level is “concealed” at the level of polytypic species if only the species names are considered (e.g. *R. vitellinus*). However, any zoogeographical analysis would be incomplete without an analysis also of well characterized historical units at the subspecies level. The ongoing process of speciation predicts that there are species with inconspicuous internal differentiation (monotypic) and others that show increasingly conspicuous intraspecific differentiation (polytypic).

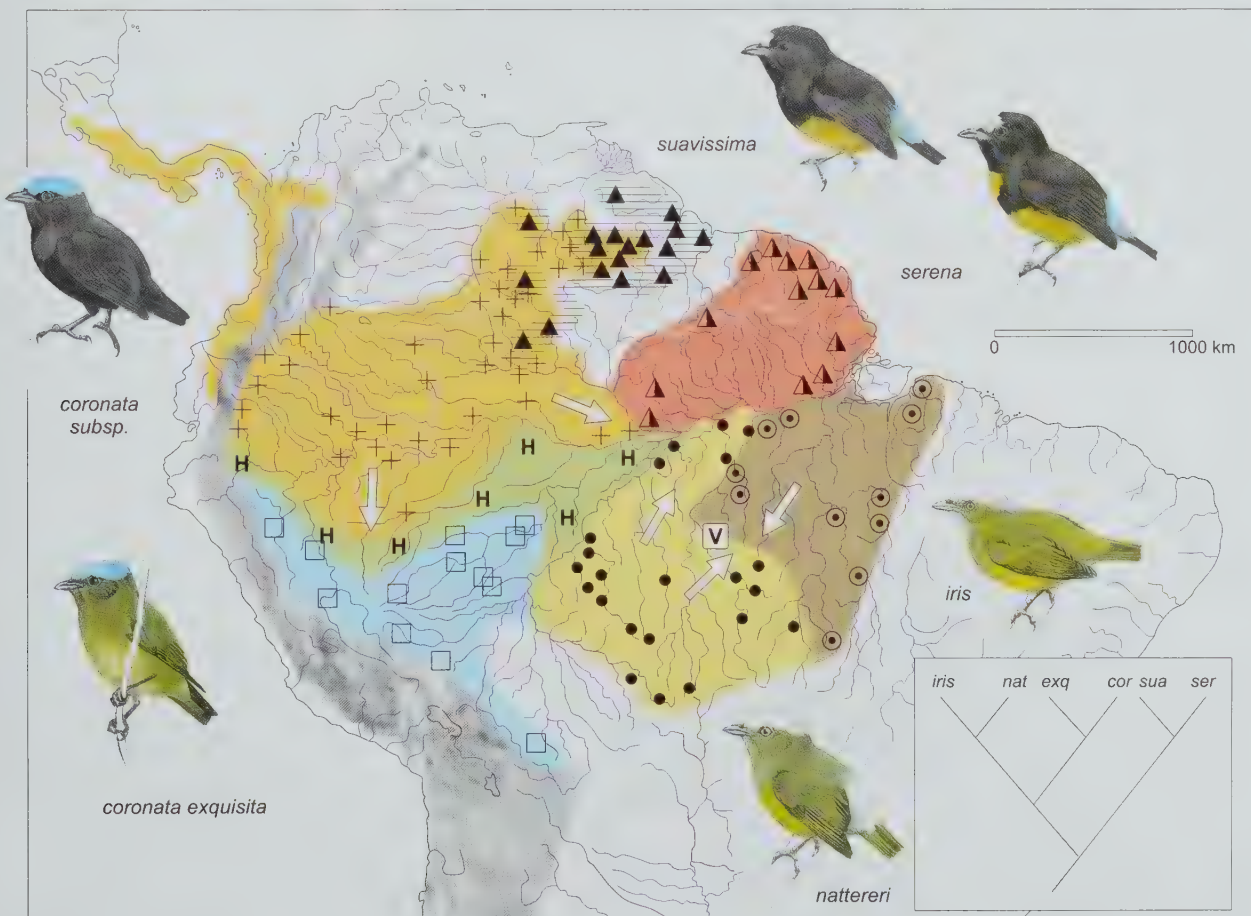
2) Amazonian manakins of the *Pipra serena* group (Fig. 4).

This group of small forest manakins comprises several sharply differentiated representatives which, in many areas, are among the commonest forest birds (Haffer 1970). The males of *serena* and *coronata* north of the Amazon River (and west of the Andes) are mainly black, while those of the southern Amazonian forms are extensively green with a yellow belly; the cap of the males is, respectively, blue or white. The females of the various forms are generally green and very similar to each other. *P. serena* inhabits the lowlands to the north of the lower Amazon and the hilly interior of the Guianas. In southern Venezuela, *P. (serena) suavisissima* is found in montane forests above 500 m in some regions which lie above lowland forests that are inhabited by the western Amazonian *P. coronata*, with its blue cap in males. At some stage, this latter form crossed the upper Amazon River southward and here hybridized extensively with the *P. c. exquisita* group of south-western Amazonia.

Geographically representative species of the *serena* group in south-eastern Amazonia are *P. nattereri*, with snow white cap and rump in males, and *P. iris*, with a glistening opalescent cap and green rump. *P. nattereri* occurs between the lower Rio Madeira and Rio Tapajós and is widespread in south central Amazonia. It has crossed the narrow upper Rio Tapajós and Xingú in an eastward direction establishing contact with *P. iris* in this general region. The latter species inhabits the area east of the lower

Fig. 4. Distribution of the *Pipra serena* group of manakin species in tropical South America. Locality records (symbols) are indicated for Amazonian forms only: half-solid triangles - *P. (s.) serena*; solid triangles - *P. (s.) suavisissima*; HHH - hybrid zone; v - type locality of “*P. vilasboasi*” (adult male with yellow cap), probably hybrids between *P. nattereri* and *P. iris*. Updated from Haffer (1970). The phylogenetic relations of the species as discussed by Prum (1988) are schematically illustrated at the lower right-hand corner.

[Figure: J. Haffer, T. Llobet, X. Ruiz]



Tapajós and most of the Rio Xingú valley east to the mouth of the Amazon River. The male plumage colour of the *exquisita* group in south-western Amazonia, with a blue cap (like *coronata*) and a green body with yellow belly (like *nattereri-iris*), is somewhat intermediate between *coronata* and the south-eastern Amazonian species. Because it hybridizes extensively with *coronata*, the *exquisita* group is included as a subspecies group in *P. coronata* under the BSC. The Rio Madeira separates the *exquisita* group from *P. nattereri*, and it remains unknown whether they would also hybridize. Should future genetic analyses reveal closer phylogenetic relationships between *exquisita/nattereri* than between *exquisita/coronata*, this would prove biospecies *P. coronata* (including the *exquisita* group) to be paraphyletic, unless this species is broadened to include *nattereri* and *iris* too. It is also still unknown whether *serena* and *suavissima* hybridize in the area of western Surinam where they may meet.

All representative forms of the *Pipra serena* group are historical (phylogenetic) entities and represent phylospecies under the diagnosable version of the PSC. Unless biospecies *P. coronata* turns out to be paraphyletic, application of the monophyly version of the PSC would result in similar species limits as those discussed above under the BSC.

3) Kingfishers of the *Tanysiptera galatea* group in the New Guinea region (Fig. 5). Paradise kingfishers are blue above and white below with long, streamered central tail feathers. The Common Paradise Kingfisher (*T. galatea*) inhabits lowland forests of mainland New Guinea in three barely distinguishable subspecies which may actually be in contact and may broadly intergrade with each other. On the other hand, the island populations off the coast of New Guinea are quite distinct. *T. hydrocharis* on the Aru Islands and in southern New Guinea is certainly differentiated as a species, because in the latter area it lives side by side with *T. galatea minor* (3). Some of the other island forms have probably also reached species level (populations 4-7); but only *T. carolinae* on Numfor Island (8) is treated as a species by all recent authors. Mainland *T. galatea* budded off these various daughter species. However, the daughter populations on the islands are not derived from the mainland species as a whole, but it is always a single local population of the widespread species on the mainland that produced a given founder population (Mayr 1987: 312). A detailed cladistic study relating each island population to a particular subspecies on the mainland is not yet available. However, it is clear that polytypic *T. galatea* on mainland New Guinea is paraphyletic (Fig. 2 B) and, according to cladistic principles, would have to be split up into a number of separate "species" that form the "stem species" of the five island populations, if the latter are indeed considered as species. Yet in reality *T. galatea* as a whole represents one widespread biological entity (biospecies) on mainland New Guinea and shows only weak geographical variation.

The changing numbers of bird species

Because of the different opinions among ornithologists and other biologists as to the taxonomic delimitation of species taxa, a higher or lower number of bird species has been recognized at all times. These different counts refer to the birds of the world as

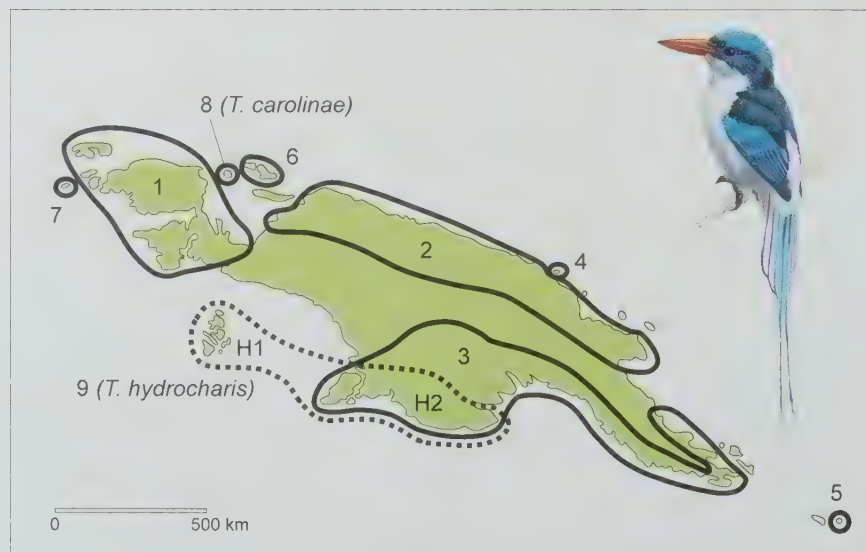
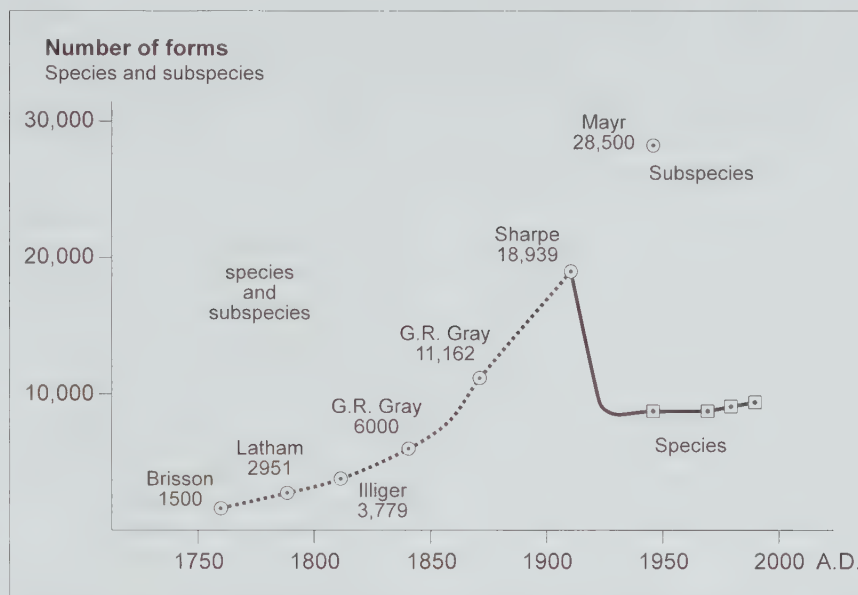


Fig. 5. Distribution of paradise kingfishers of the *Tanysiptera galatea* group in the New Guinea region. The three mainland forms of *T. galatea* (1-3) are barely distinguishable. The island populations (4-7) are more distinct and some of them have probably reached the species level, like *T. carolinae* (8). The Aru Islands (H 1) and southern New Guinea (H 2) originally formed a single island, on which *T. hydrocharis* differentiated. When south New Guinea became attached to the mainland the south-east New Guinea subspecies (3) of *T. galatea* invaded the area; the fact that it does not interbreed with *T. hydrocharis* proves that the latter had become a species during its isolation. From Mayr (1942, 1963), slightly modified on the basis of the description of distribution (not the simplified maps) of Fry et al. (1992).

[Figure: J. Haffer, T. Llobet]

Fig. 6. Increase of the number of species and subspecies of birds known during the last 250 years.

Application of the biological species concept shortly after the end of the 19th century caused a conspicuous decrease in the number of species taxa recognized, a development which was halted during the late 1920's, when geographically representative biospecies were discovered. From Haffer (1992).



a whole, of a large continental region or an island archipelago, though not to the number of bird species of a small area or at a single locality which, of course, coincides under the various species concepts discussed. Ornithologists delimiting species taxa narrowly arrive at high numbers of species which, during the last century, were rapidly increasing due to the continuous discovery and description of new forms made known through the work of numerous scientific expeditions (Fig. 6). The leading museum ornithologists in Europe applied narrow species limits toward the end of the nineteenth century, resulting in the recognition of high numbers of species taxa, mainly through the influence of the authoritative *Catalogue of Birds in the British Museum* (27 volumes, 1874-1898). This trend culminated when R. B. Sharpe published his *A Hand-list of the Genera and Species of Birds* (1899-1909) recognizing 18,939 species, many of which represent allospecies and subspecies.

During the following 20 years, the situation reversed itself entirely. Numerous Linnaean morphospecies were reinterpreted as subspecies and combined in more widely conceived biological species taxa. The result was a precipitous decline in the number of species recognized (Fig. 6). A period of moderate stability regarding species numbers followed during the 1930's and early 1940's, when Mayr (1946: 68) estimated the total number of known birds to be 8616 species. A gentle increase of species numbers began during the late 1940's when many geographically isolated representatives formerly considered subspecies were reinterpreted as species and combined in superspecies. This "quiet revolution" (Mayr 1980) at the microtaxonomic level during the last 30-40 years led to a continuous increase in the number of bird species, only slightly boosted by the discovery of genuine new biospecies (153 species in the period 1938-1985; Vuilleumier & Mayr 1987). Bock & Farrand (1980) counted a world total of 9021 species and Sibley & Monroe (1990) 9672 species. In the latter species list, superspecies are indicated to give a measure of ecological units in the world's avifauna.

The world total would go back up to c. 20,000 bird species if the narrow diagnosable version (PSC 1) of the phylogenetic species concept were applied to the avifauna of the world, with many subspecies being ranked as "species". However, in view of the wide variety of species concepts proposed during the last 15 years (Claridge *et al.* 1997; Wheeler & Meier 1997), it would be premature and inadvisable if the current stability and agreement in delimiting bird species under the biological species concept were upset at this time of rapid development of taxonomic methods and thinking, and a narrow version of the phylogenetic species concept (PSC 1) generally applied. The biological species concept, while not perfect, is useful and meaningful. This is probably the main reason why the authors of almost all recent ornithological textbooks and all regional handbooks have preferred the traditional concept of biological species as the basis for discussing the avifaunal diversity of the world (Sibley & Monroe 1990, del Hoyo *et al.* 1992 ff.) or of individual continents (Cramp & Simmons 1977 ff.; Brown *et al.* 1982 ff.; Ridgely & Tudor 1989 ff.; Marchant & Higgins 1990 ff.).

The biological species concept continues to form the basis of global conservation biology (Collar 1996, 1997), the main problem with the narrow version of the phylogenetic species concept being the limit of "diagnosability". Stotz *et al.* (1996: 118) also used the biological species concept as the basis of their work on the ecology

and conservation of Neotropical birds stating that "we can more effectively discern patterns useful in guiding conservation action by focusing on biological species." Many conservation biologists analyse "evolutionary significant units" and judge their need for protection regardless of whether these units are considered as species or subspecies under different species concepts. Views in conservation biology as to which taxa need to be protected are independent of the particular species concept applied by systematists. Therefore, taxa do not have to be recognized as species in order to be conserved (Bock MS).

An ideal species concept for all groups of organisms that is at the same time general, applicable and theoretically significant may be unattainable. As Hull (1997) remarked, theoretical significant species concepts tend not to be very operational. Attempts to make them more operational result in their being theoretically less significant. I emphasize that many levels of differentiation at which species limits have been proposed are biologically significant. It will be advisable, therefore, that these stages of increased microtaxonomic differentiation continue to be analysed in depth. In this way, the conceptual relations among the various taxonomic categories and their component taxa may be studied, and the various entities may be used in analyses of the biogeographical and phylogenetic history, as well as the ecological divergence, of genera and families of birds.

Note: In practical terms, the BSC remains the most efficient tool at present in most fields of ornithological research, and in the same way the organization of the species recognized equally requires a good degree of stability, which leads on to another controversial topic of current systematic ornithology, namely the distinction between classifications and sequences (Mayr & Bock 1994; Mayr 1997; Bock 1994, In press). Provisional classifications of genera, families and orders of birds are proposed by specialists on the basis of their analyses of the phylogenetic relationships among such macrosystematic units. Even well established classifications are subject to eventual change. A standard sequence such as Peters' *Check-list of Birds of the World* (1931-1987) is derived from widely accepted classifications, and represents a consensus in the linear arrangement of taxa to permit optimal communication among avian biologists. A standard sequence should be followed by authors and editors of ornithological textbooks and faunal lists until enough new data about avian relationships have been gathered to permit agreement on a revised standard sequence. As valuable as Sibley & Ahlquist's (1990) and Sibley & Monroe's (1990) work on the phylogeny, classification and taxonomy of birds of the world has unquestionably been, their classifications and sequences are provisional and full of uncertainties. They should not be considered as the basis of a new standard sequence, except with respect to certain well established shifts that might be made now, though even such minor modifications of the standard sequence might not be wise (Mayr & Bock 1994).

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Introduction to Volume 4

As with the previous two volumes, readers are referred to the general introduction to the whole HBW series, which appeared in Volume 1 (pages 15-33), while the very brief introductions to Volumes 2 and 3 might also be consulted regarding a few particular points of policy.

At the macrosystematic level, the present volume offers few surprises. Some time ago, it was decided that the most appropriate treatment in HBW for the sandgrouse (Pteroclididae) would be to separate them in their own order, Pterocliiformes (see Volume 3, page 20). Similar action might have been taken with the turacos (Musophagidae), but that additional change was considered inappropriate for the purposes of HBW. At a somewhat lower level, another major issue in this volume was how to treat the cockatoos, whether to separate them in a family of their own (Cacatuidae) or to lump them within the parrots (Psittacidae). However, on this particular issue most systematists now appear to agree that two families are probably involved, so the decision to follow this version did not prove too difficult.

The present volume thus covers a total of four orders, yet only six families, this latter figure being the minimum planned for any one volume in the entire series. Indeed, had two of the aforementioned decisions been reversed, the volume could have ended up with the rather unsatisfactory arrangement of only five families constituting five orders! However, the paucity of families is more than balanced by the fact that two of them are among only three non-passerine families that number over 300 species, and as a result this volume covers more species (837) than any other of the non-passerine volumes.

Within the families covered herein, one particularly awkward problem stands out, one that affects the nomenclature of some of the tiny fig-parrots. The first genus name to be awarded exclusively to the species in question was *Cyclopsitta* Reichenbach, 1850. Subsequently, perhaps on the grounds that many of Reichenbach's names were unidentifiable, a different name was proposed, namely *Opopsitta* P. L. Sclater, 1860. Yet another name then arrived, *Cyclopsittacus* Sundevall, 1872; the rationale behind this third name is unclear, but one possibility is that it was intended as a linguistic correction of the first name on the spurious grounds that *Cyclopsitta* was an incorrectly formed name. When it came to the business of a family-group name, the first to be proposed was Cyclopsittacini, which appeared in 1891, and was based on the youngest of the three proposed genus names. This was followed up in 1912 by the proposal of Opopsittini, while "Cyclopsittini", the hypothetical name based on the oldest of these genus names has never actually been proposed. After all this chopping and changing the confusion persisted, and throughout the present century the two species belonging to this group have repeatedly suffered name changes, although *Opopsitta* has probably been the most commonly used form. One of the reasons for this general uncertainty was that Reichenbach's description was said to refer not to a member of this group, but

rather to some form of the closely related genus *Psittaculirostris*, but this has quite recently been discarded and Reichenbach's correct identification confirmed. As both versions had been extensively used, a decision was necessary in order to steer towards some sort of stability in the nomenclature of the group. The somewhat more commonly used *Opopsitta* was the ideal choice, particularly as it might have sat tidily in the subfamily Opopsittini. Rather regrettably, however, the alternative option was selected, mainly on the grounds that Reichenbach's name did indeed fit the species in question, and this decision has now been widely followed. As the name "Cyclopsittini" has not been officially proposed, effectively it does not exist, so the available family-group name is Cyclopsittacini, a name unfortunately based on an obsolete genus name. While this is a very messy solution, it is deemed quite inappropriate now, just when these names are finally beginning to gain a little stability, to take the necessary action of trying to reinstate *Opopsitta* and Opopsittini. For these reasons, the apparently impossible combination of *Cyclopsitta* with Cyclopsittacini is, in fact, the recommended version.

Several other problem cases of nomenclature turned up in the present volume, but space does not permit their full explanation either here or in the main body of text. However, very brief mention might be made of a monotypic parrot genus very close to *Aratinga*. When a separate genus was proposed for the Golden Parakeet, the genus name was initially given as *Guarouba* Lesson, 1831. However, on the very next page, when referring to the full species name, the author spelt this as *Guaruba guarouba*. Clearly, there is room for discrepancy but the form *Guarouba* was the first mentioned, and it has the added advantage of coinciding precisely with the specific name, so it has been adopted herein.

As ever, each family offers its own particular "specialities", and this means that a certain amount of leeway is necessary within the strict general structure of HBW. For instance, with the notorious parasitic tendencies of some cuckoos, it was felt that it would be useful to include a list of host species, as well as noting details of egg size and colour; this also appeared an obvious case for the inclusion of a Voice subsection.

Of all the bird families with large numbers of species, none has a higher proportion of threatened species than the parrots (Psittacidae). One of the aspects that has been found to be critical in this particular crisis is the fact that the family also contains a very high proportion of restricted-range species (see page 332). Because of this, it was considered appropriate in this case to list precisely which parrot species have been classified as restricted-range species; indeed, it may turn out that this aspect is worth noting for all families in subsequent volumes.

One of the requests that has been put forward by reviewers and private individuals alike is that the Descriptive notes section could, on occasion, usefully be bolstered to provide fuller details, and with the large, subtly plumaged pigeon family, Columbidae, an attempt has been made to include fuller notes, including relevant details of bare-part coloration. However, with the even larger parrot family, fuller descriptions were not considered likely to be of great value, since the plumage differences in this family are generally far less subtle.

We fully appreciate that not all of our readers will agree with all of these decisions, but we do hope that they will not be considered too far from the mark.

Readers will rapidly notice that the number of artists has increased from 5-10 in previous volumes to 18 in the present one. While some increase in the team was already known to be unavoidable, with the number of figures planned for Volume 4 almost doubling that for Volume 3, nonetheless the team for the current volume grew rather larger than originally intended, largely due to a combination of personal circumstances. In the interests of avoiding an excess of different styles, it is hoped that in future volumes it will prove possible to stabilize the situation with some 10-14 artists participating in each volume. However, in this aspect, as in many others, we are fully conscious that we owe it to our readers to make every effort to ensure that the different volumes of HBW continue to appear on schedule, as this increases the value of the work as a whole. If this means slightly more divergence in style, we believe that this is an acceptable price to pay for avoiding delays, but our readers, of course, have the final word.

The maps follow the same criteria as in previous volumes. Three colours are used: yellow indicates breeding only; blue indicates non-breeding only (not including birds on passage); and green, the sum of the other two, indicates both breeding and non-breeding, in almost all cases at least some part of the population being resident.

The maps continue to present their own problems, as the available data on distribution are frequently rather sparse, and even on occasion contradictory. As a general rule, the different degrees of local coverage may mean that some species are fairly frequent,

almost annual trans-Atlantic vagrants, with dozens of records from the “wrong side”, yet their status in that zone is still unquestionably that of vagrants. At the other extreme, a single, sometimes old record from one of the ornithologically less intensively studied areas may be the basis of that area being marked on a map. Such cases clearly require careful consideration, but we feel that evidence of single records should not be dismissed outright, as on that basis some areas would end up with non-existent avifaunas, while some species known to be extant would receive blank maps.

Another difficult area with maps can be an adequate depiction of a species' migratory tendencies. If a species breeds, say, in North America and winters *in toto* in South America, the case should be fairly clear-cut. However, when dealing with nomadic species, especially in Australia, or with local migrants, for instance in Africa, it is frequently very difficult to map the available data accurately and informatively; the only reasonable solution in such cases is sometimes to map the entire area of distribution green, leaving the explanation to the Movements section of the text. Given the scale of the maps, it is essentially impossible to indicate altitudinal movements.

As explained in Volume 1 (pages 28-29), the maps normally show only a species' “natural” distribution. However, in a very few cases it is deemed appropriate to include areas where the species is introduced, if it has become firmly established there. One obvious and very notable case in this volume is that of the Rock Dove (*Columba livia*), a species which is well known for having colonized man's cities over much of the world. In fact, the authors and editors alike had thought that inclusion of the species' “natural” distribution only in this case would be rather more instructive, but in the end this proved impracticable, largely due to the confusion as to which populations are genuinely “natural”; indeed, the validity of several races remains questionable, as they are sometimes claimed to be of hybrid origin, resulting from the crossing of wild birds with feral pigeons. This mixing tendency continues to the present day, with the unfortunate, somewhat paradoxical consequence for this ubiquitous species that its “natural” populations are dwindling apparently towards extinction almost everywhere.

It may be useful to repeat once again the idea behind the use of an exclamation mark with Other common names. The sole purpose of its use in this section is to indicate the possibility of confusion in using the name in question, since it is commonly applied to another taxon. In order to avoid excess clutter, the exclamation mark is usually applied only in cases where the name in question is actually used as the accepted name in HBW of another species. However, a few other cases appear to call for its use in a similar way, notably when dealing with a name that is widely applied to a species, but is not the one actually selected for HBW. One such case might be that of the Golden Dove (*Ptilinopus luteovirens*), which amongst its Other common names includes “Lemon Dove”. This last name is commonly applied to an African species which in HBW has been split into two, the African Lemon-dove (*Columba larvata*) and the Sao Tome Lemon-dove (*Columba simplex*). Because of this split there is no species actually listed in HBW as the “Lemon Dove”, but nevertheless it is hoped that readers will agree that it is preferable to indicate the potential confusion that would be generated in applying this name to *Ptilinopus luteovirens*.

As before, the accepted French, German and Spanish names come from the sources indicated in Volumes 1 and 2. Missing names were kindly supplied by the relevant committees, and we thank both Henri Ouellet (French) and Peter Barthel (German) for their time and assistance. The list of recommended Spanish names continues to be published periodically, the last batch appearing in *Ardeola* 43(2): 231-238.

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Order PTEROCLIFORMES

Pterocliiformes

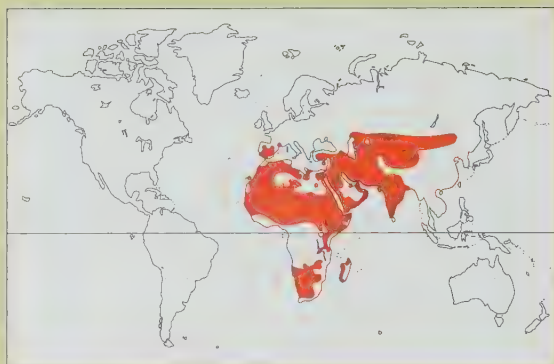
Pteroclididae

sandgrouse

Class AVES

Order PTEROCLIFORMES

Family PTEROCLIDAE (SANDGROUSE)



- Medium-sized terrestrial birds, superficially similar to partridges or pigeons, with short bill, small head, long wings, short legs and feathered tarsi; toes sometimes feathered.
- 24-40 cm.



- Afrotropical, Palearctic and Oriental Regions
- Open areas, generally in arid or semi-arid zones.
- 2 genera, 16 species, 36 taxa.
- No species threatened; none extinct since 1600.

Systematics

The position of the sandgrouse is amongst the most heavily debated questions in avian macrosystematics. In external morphology, the short bill and short legs give them an aspect reminiscent of partridges and grouse. Like the latter, they show feathered tarsi, whence the English name "sandgrouse" and also the fact that Linnaeus placed them in the genus *Tetrao*. However, unlike the gamebirds of the order Galliformes, they have relatively long, very pointed wings. This feature must surely have led C. J. Temminck to decide on the name *Pterocles* from the Greek word *pteron*, meaning "wing", when he saw fit to place them in a genus of their own in 1815. The long, pointed wings of sandgrouse suggest a certain similarity with the pigeons (Columbidae), which are also short-legged seed-eaters, like the sandgrouse.

Throughout the nineteenth century widely differing kinds of anatomical studies appeared to confirm these impressions and led taxonomists to include the sandgrouse in one or other of these two major groups, the Galliformes or Columbiformes, though there were also writers, like H. von Gadow for example, who saw similarities with the waders.

The sandgrouse seemed to resemble the pigeons more as regards plumage and muscular structure, while their digestive tract indicated a similarity with the Galliformes. As regards the skeleton, the likenesses were so evenly balanced that in 1867 T. H. Huxley came to the conclusion that the sandgrouse's perfect state of transition warranted the creation of an independent order to be called Pteroclomorphae. The little that was known at that time about the life histories of these birds did not help much: it was known that, as with pigeons, sandgrouse laid few eggs and both sexes participated in incubation; and that, like gamebirds, they nested on the ground and had precocial chicks. In a way that was equally mistaken and unaccountable, it was alleged that one behavioural feature supported the claims of a relationship with the pigeons: namely, that sandgrouse drank without having to raise their heads to swallow.

Gradually the idea that the sandgrouse were related to the Galliformes was allowed to drop, and since the end of the last century most classifications have elected: either, as in the notable cases of Wetmore, Peters, Mayr and Amadon, and Vaurie, to include the sandgrouse within the Columbiformes with the status of a suborder; or, as in those of Beddard, Stresemann, and Voous, to consider them as forming a separate order, though immediately preceding the pigeons. However, these traditional points of view were violently shaken from South Africa in 1967, when G. L. Maclean affirmed the possibility of a close relation-

ship between sandgrouse and Charadriiformes, producing strong evidence that, for the first time, was based on detailed field observations as well.

It was pointed out that not only did sandgrouse not drink in the same way as pigeons, a fact that bird-fanciers had known for ages, and that D. Goodwin too had mentioned, but, amongst other things, they flew in a very different fashion too; they opened their bills when they called, and did not make cooing sounds; they did not build stick nests; their clutches consisted of three eggs, not two; their eggs were pigmented, not white; and their chicks were able to feed themselves from the day of hatching. Morphologically, the shape of the wings, the presence of a hyporachis on the contour feathers, the downy-covered apteria, the holorhinal bill with the bony aperture of the nostrils rounded, the absence of a cere, the symmetry of the syrinx muscles, and various different features of the digestive tract all helped to place them closer to the waders. On top of this weight of evidence, Maclean also made a revealing comparative study involving electrophoretic analyses of the albumen of sandgrouse, pigeon and wader eggs. Although some voices were raised in loud protest, C. G. Sibley and J. E. Ahlquist soon backed up the idea of the proximity of sandgrouse and waders on the basis of egg-white proteins, and J. Fjeldså pointed out the extraordinary degree of likeness in the mottled plumage of chicks between those of sandgrouse and those of some Charadrii waders, namely the coursers (*Cursorius*). The similarities to the pigeons could be ascribed to a common ancestry within the lineage of the waders, but the pigeons, with many derived characters related to an arboreal way of life, must have split off before the sandgrouse. Recent research with DNA has provided further support for these theories and in Sibley and B. L. Monroe's recent classification the sandgrouse are placed in an infraorder of Charadrii, itself a suborder of their much enlarged Ciconiiformes. While the case for the pigeons appears to be receding, and that of the waders to be growing, on present evidence it seems best to award the sandgrouse an independent order of their own, Pterocliiformes, placed immediately between Charadriiformes and Columbiformes. It should be remarked that the scientific name of the family has frequently been given as Pteroclididae, but, while that variant spelling is not actually incorrect, the shorter form Pteroclidae has now been strongly recommended for general adoption.

There is far less controversy concerning the internal classification of the group, as a single family is recognized, almost invariably with two genera and a total of 16 species in all. This small, homogeneous unit is split generically by only one feature: the 14 *Pterocles* species have "normal-looking" toes, although

the hind toe is small and raised; whilst the two species in the genus *Syrrhaptes* have only the forward toes, and these are feathered and largely fused, whence the generic name, which means "sewn together" in Greek. Though more divisions have been suggested, recent authors tend at most to accept subgenera within *Pterocles*.

Sandgrouse are found exclusively in the Old World, with *Syrrhaptes* in central Asia and *Pterocles* throughout most of Africa, the extreme south-west of Europe where only two species occur, and southern Asia. The greatest concentration of species nowadays is to be found in the Saharo-Sindian zoogeographical zone, all the dry lands that stretch from northern Africa through the Middle East to the deserts of Pakistan and India. The oldest fossils, belonging to several species of the genus *Archaeoganga*, date from the Eocene and Oligocene in France, but the sandgrouse had probably appeared before then. Differences in DNA suggest that they may have split off from the waders some 77 million years ago in the Upper Cretaceous. Given that at that time the climate must have favoured the existence of subtropical forests over most of Eurasia, the group is likely to have originated in Africa and spread to other areas only later, when the great Palearctic deserts developed in the Middle Tertiary. Fossils of the genus *Syrrhaptes* have been found from the Pliocene in Mongolia and the Pleistocene in Hungary.

The differences between the present-day species relate to their external morphology, especially to colour patterns and the shape and length of the central rectrices. In *Syrrhaptes* and four species of *Pterocles*, the central two tail feathers are much longer than the others, probably a primitive feature that existed before the separation of the genera. Another half dozen species have central rectrices the same length as the others, but different in shape, for they are clearly pointed. In the remaining species the tail feathers are all very much the same. As to the plumage patterns that are particularly remarkable in the males, the head and underparts usually show characteristic markings, typically black patches on the forehead, face or throat, transversal bands across the breast, or black or dark chestnut areas on the belly.

The Black-bellied (*Pterocles orientalis*) and Pallas's Sandgrouse (*Syrrhaptes paradoxus*) occupy adjacent Palearctic ranges, they both show black belly patches and other plumage similarities, and the idea has been put forward that the four-toed Black-bellied might in fact be closer to the ancestral type, despite possessing short central rectrices. The combination of dark belly and long central rectrices, supposedly of primitive origin, occurs not only in Pallas's Sandgrouse, but also in three *Pterocles* species: two of these are Saharo-Sindian in distribution, namely the Spotted (*Pterocles senegallus*) and the Chestnut-bellied Sandgrouse (*Pterocles exustus*); the third, the Namaqua Sandgrouse (*Pterocles namaqua*) of southern Africa, may be closely related to the Chestnut-bellied. A pin-like tail but accompanied by a white belly is shown by both the Tibetan Sandgrouse (*Syrrhaptes tibetanus*) and the Pin-tailed Sandgrouse (*Pterocles alchata*), both Palearctic in their distribution, the latter being possibly the most colourful of all the sandgrouse.

Among the short-tailed *Pterocles* species, three are distinctive because of the extensive black mask-like patches on the face displayed by the males: the Crowned Sandgrouse (*Pterocles coronatus*), widespread in Asia and Africa; the Black-faced Sandgrouse (*Pterocles decoratus*), found in east Africa; and the Madagascar Sandgrouse (*Pterocles personatus*), endemic to Madagascar, where it is the only sandgrouse that occurs. Another four form a fairly easily separable group: Lichtenstein's Sandgrouse (*Pterocles lichtensteinii*); the Four-banded Sandgrouse (*Pterocles quadricinctus*); the Double-banded Sandgrouse (*Pterocles bicinctus*); and the Painted Sandgrouse (*Pterocles indicus*). All of these are relatively small and have central rectrices of normal length, black and white patterning on the forehead and crown, one or more breast bands, and densely barred underparts. They also have a distinctive habit that none of the others possess: they visit water-holes only as it is getting dark or during the night, a habit that has earned them the name of *Nyctiperdix*, the subgenus in which they are sometimes placed. The most widespread, and presumably the most primitive of these, is Lichtenstein's Sandgrouse, which is found in both Africa and

The sandgrouse form a remarkably homogeneous group of medium-sized terrestrial birds, admirably adapted to life in arid environments. One of the smaller species, the Double-banded Sandgrouse, shows many of the salient features of the family: the head is small, the body sturdy and somewhat elongated, and the bill, neck and legs are short. In addition, importantly, the plumage is cryptic, both in colour and patterning, ideally suited to a bird heavily exposed to predation from above, as it forages for seeds on open ground for many hours of the day. The tail of the Double-banded is shortish and rounded, lacking the elongated central feathers of some of the other sandgrouse.

[*Pterocles bicinctus bicinctus*, Biyamati, Kalahari National Park, South Africa.
Photo: Ramón Mascort]



Asia. The other three are allopatric, the Double-banded inhabiting southern Africa, the Four-banded central parts of Africa south of the Sahara, and the Painted endemic to the Indian Subcontinent. The latter two species are so alike that they are usually considered to form a superspecies.

Finally there are two Afrotropical species which show features that are rather strange, though not exactly aberrant. The male Yellow-throated Sandgrouse (*Pterocles gutturalis*), from southern and eastern Africa, displays a black eyestripe and a gorget on the neck that together run round a yellow area on the face and throat. Burchell's Sandgrouse (*Pterocles burchelli*), which occurs only in southern Africa, has sometimes been split off to form the subgenus, or even the separate genus, of *Callopteroles*. It is perhaps the sandgrouse with the most singular plumage of all, with both sexes showing large white spots on a mainly rufous ground.

Morphological Aspects

In overall structure, the different species of sandgrouse are rather similar. The extent of variation in size and weight is relatively small, while likewise there is only limited sexual difference in these aspects, males being slightly larger. Total length generally varies from about 24 cm to 35 cm, but logically it is somewhat greater in the species that have elongated central tail feathers, such as the two *Syrrhaptes*, where it can reach 40 cm or more. Weight varies from 150-200 g in species like Lichtenstein's, Painted and Namaqua Sandgrouse to as much as 400-500 g in the Black-bellied Sandgrouse.

The external appearance of the sandgrouse is closely linked to their feeding habits: as they are adapted to foraging for scattered seeds on the ground, the bill, neck and legs are short, and since they must spend long hours in the open to obtain enough food, they are very cryptically coloured. In addition, their pointed wings and strong musculature enable them to take off rapidly if need be. Similar adaptations are found in groups that are eco-

logically and probably even phylogenetically close, such as pigeons, parrots and also, within the Charadriiformes, seedsnipes (Thinocoridae), a small group of South American birds which at a casual glance look very much like sandgrouse.

Despite the shortness of their legs, sandgrouse are very nimble in their movements on the ground. Gait is normal; they do not waddle, as many have asserted. Indeed, they walk almost daintily, taking short steps, but at the same time placing their feet squarely beneath the body and without shaking their heads constantly as pigeons do. When they need to, they can run surprisingly fast, all the while keeping their heads up and their necks stretched. The morphology of the feet is as in birds adapted for running, with very short front toes and a small raised hind toe, except in *Syrrhaptes*, which lack the hind toe altogether. Perhaps because of this toe arrangement, and again quite unlike pigeons, sandgrouse alight only on the ground.

Sandgrouse have 11 primaries, the first of which is vestigial; 17 or 18 secondaries; and 14-18 rectrices. The wings are very similar to the wings of Charadriiformes, mainly due to their eutaxic lay-out and because they have long, pointed tertials. The wings are relatively long, not so much in the broad proximal section, closest to the body, as in the distal section, where the outermost primaries get progressively longer. It is a "high-speed" type of morphology which provides for strong, direct, sustainable flight with cruising speeds calculated at close to 60 or 70 km an hour, speeds that sandgrouse are capable of keeping up over long distances. A similar type of flight is seen in certain waders, such as the plovers of the genus *Pluvialis*, although the silhouette of sandgrouse in flight is different: the head is small, the tail often elongated or pointed and the wings seem to be set well forward. The birds flap their wings continuously, scarcely ever gliding except when about to land. They take off suddenly, springing up vertically. When several birds are in the air together they fly in close formation, maintaining their distances.

The integument, or skin, in sandgrouse appears to be consistent with a thermoregulatory strategy based on insulation (see General Habits), perhaps because variations in temperature are



The Crowned Sandgrouse is a true desert dweller, occurring, for instance, in the hottest areas of the Sahara. This pair at a water-hole exemplify the sexual dimorphism common to all pteroclidids. Size varies little between the sexes, the male being slightly larger and heavier, but the female has more muted plumage patterns, reflecting her greater need for camouflage, as she incubates during the daytime in the open. The distinctive markings of male sandgrouse are generally found on the face, neck, breast and belly, the areas most conspicuous in any frontal display. The female Crowned Sandgrouse shows a more diffuse head pattern than her partner, and is much more densely spotted and barred.

[*Pterocles coronatus saturatus*, Yalooni, Oman.
Photo: Hanne & Jens Eriksen/Aquila]

A male Pin-tailed Sandgrouse lands, showing off his long, pointed wings. This wing shape, allied to strong musculature, enables sandgrouse to spring up into the air vertically on take-off, and to maintain high cruising speeds over long distances. In the two birds on the ground, the wedge-shaped tail is plainly evident, with the two greatly elongated central rectrices that give the species its name. The short tarsi are feathered, and the arrangement of the three strong but short toes with a raised rudimentary hind one allows the bird to walk well and run surprisingly fast.

[*Pterocles alchata alchata*, Belchite, north-west Spain. Photo: Miguel Angel Bielsa]



so great in the environments in which they live. The skin is rather hard and the feathers are densely packed in, leaving small apteria covered for the most part in down. Yet each contour feather has an ample plumulaceous base and a small hyporachis. The feathering extends over the base of the bill, covering the nostrils; and over the legs, in the genus *Pterocles* only over the front part of the tarsometatarsi, but in *Syrhaptes* also over the rear part and over the toes, perhaps as an additional adaptation to the cold of the central Asian deserts. The soles of the feet, which must often have to endure contact with scorching ground, are very thick and covered in small scutes.

A remarkable characteristic of sandgrouse plumage is the great capacity that the belly feathers have for absorbing and retaining water, a feature linked to the way in which the adults provide their chicks with water (see Breeding). There are also small lateral and ventral surfaces where the down is partially modified as powder-down, which is used in preening, aided by a relatively small, bare uropigial gland.

Essentially, plumage coloration fulfils the demands made by the need for camouflage, with sandy or ochraceous, sometimes greyish, ground colours predominating, together with variously speckled, barred or vermiculated feather patterning, mainly on the upperparts. The underparts are usually paler in colour, acting as countershading, and they often show bold markings, especially in males. These markings, chiefly consisting of bars or transversal bands on the breast or belly, hardly show up at all in the final cryptic effect. Either they are lost in the shadow cast by the body or they are out of sight when the birds, conscious of some danger, flatten themselves to the ground. The male, and rarely the female, may also have certain specific markings on the head. These can be black and white patterns, perhaps partially disruptive in intent, or areas in various subdued shades of red, orange, yellow or blue. The bill and legs are usually muted in colour, but there is an area round the eye which may be quite strikingly blue, yellow or white in the adult.

Sandgrouse go through a complete annual moult, which, in those species for which information is available, seems to be mainly post-breeding, even if it may begin very early and continue throughout the breeding period. In the Pin-tailed and Black-bellied Sandgrouse, the primaries are moulted from May to October. Primary moult takes place in descendant order and rather

slowly, so that a feather falls out when the preceding one is already advanced in growth. Exceptionally, in the Pin-tailed Sandgrouse a second, partial post-breeding moult occurs, which brings the male into spring plumage colours with a characteristic black bib and yellow spots on the back. The dull juvenile plumage, in most cases not very different from the female's, is changed a few months after hatching in a moult that is almost complete, but in which some of the juvenile outermost primaries are retained.

Habitat

On the whole, sandgrouse are typical inhabitants of arid regions, for which they show all kinds of obvious adaptations. In the deserts of the Old World they are among the most characteristic and apparently successful forms of animal life. However, not all of the species, in fact only a minority, are typical of true deserts, and as a whole sandgrouse occupy a fair variety of habitats. Precise habitat preferences, in addition to differences in body size and perhaps other differences as yet little understood concerning daily patterns of activity and types of food, may play a part in determining ecological segregation in regions where several species occur together.

In north-west Africa, for instance, the Black-bellied and Pin-tailed Sandgrouse inhabit only the most northerly regions, which have a semi-arid Mediterranean climate with more or less regular seasonal rainfall, and where these species occur on both scrub-covered steppes and cultivated land. In contrast, the Spotted, Crowned and Lichtenstein's Sandgrouse are to be found only to the south of the Atlas, in dry, arid zones where rainfall is sparse and irregular. The Black-bellied and Pin-tailed Sandgrouse are rather different in size and, the former seems to prefer higher areas that have more vegetation cover. Once into the Sahara, the Spotted Sandgrouse is particularly common in somewhat damper coastal areas, or in enclaves where there is at least some vegetation, while the Crowned will tolerate or prefers bare, stony terrain, and Lichtenstein's, a smaller species with crepuscular habits, only occurs in rugged rocky areas with scattered bushes and acacias. The situation is the same in other regions, so actually it is rare to find a locality at which more than a couple of species are common at one and the same time.



A small flock of Tibetan Sandgrouse forages on a high gravelly river plain against a background of snowclad mountains, typical habitat for this species, which lives in some of the most remote and inhospitable country in the world. It is a truly high-altitude sandgrouse, occurring up to 6000 m in some areas, and often breeding on flat plateaux fringed by snowfields. Though mainly sedentary, in winter it descends to south-facing slopes where snow cover may be only slight. Interestingly, unlike other sandgrouse, it does not show a great dependence on water and makes no regular flights to drink.

[*Syrrhaptes tibetanus*, China.

Photo: Roland Seitre/Bios]

Some sandgrouse seem quite uncompromising in their choice of habitat. For instance, the Tibetan Sandgrouse lives exclusively high up in mountainous areas, generally above 4000 m, and the Yellow-throated favours grassland that is close to rivers or marshes on alluvial plains. These preferences may be correlated to coloration at times: thus, in southern Africa, the rufous Burchell's Sandgrouse is found chiefly among the red sand dunes of the Kalahari or sandveld, whilst the brown Namaqua Sandgrouse frequents rocky terrain of the same colour in areas to the south and east of the same desert. Nevertheless, there are other species that do appear to accept a certain variety of conditions: the Double-banded Sandgrouse, for example, inhabits both the dry gravel plains of the Namib Desert and the mopane (*Colophospermum*) savanna of the Zambezi Valley.

General Habits

Sandgrouse are gregarious birds, as their seed-eating habits might lead one to suppose. Flock size differs according to the species, geographical location and season of the year. For some species, observations mainly concern single pairs, but normally they refer to small flocks. The tendency to flock seems to be greater outside the breeding season, although even when they are breeding, pairs tend to maintain a certain amount of contact with each other. In the southern African Namaqua Sandgrouse, flocks seen habitually on the foraging grounds number 10-100 birds, but exceptionally they may number thousands.

Normally flocks are of only one species but sometimes certain species do associate, as occurs in Morocco with the wintering populations of Spotted and Crowned Sandgrouse. In central Spain flocks of Pin-tailed Sandgrouse systematically join up with parties of Little Bustards (*Tetrax tetrax*), apparently to take advantage of the greater height of the latter with a view to exploiting rich feeding grounds, such as fields of alfalfa; the sandgrouse on their own would not enter such crops on account of the height of the vegetation.

Another of the definitive features of sandgrouse behaviour is their unobtrusiveness, calculated to avoid predation and very much in keeping with their highly cryptic colouring. It is difficult to spot them on the ground among the stones or low bushes

typical of their habitat, when they give the impression of deliberately choosing to move around on the substrates that harmonize best with their own plumage. It is even more difficult to see them, when, if conscious of some danger, they crouch down and remain perfectly still, before suddenly flying off at the last minute. The almost complete lack of aggression between individuals also helps them to escape detection: various different authors have stressed the pacific, tolerant character of the sandgrouse. It has been suggested that this might have something to do with the kind of food they eat, mainly small scattered seeds not worth squabbles that might entail expenditure of energy, or with becoming overheated, most inadvisable in hot environments, or with increasing the risk of exposure to potential predators. Hence, perhaps, there is an apparent lack of hierarchy in flocks and a resultant almost complete lack of threat or appeasement displays.

However, sandgrouse cease being unobtrusive at one stage in their daily routine, namely when they fly to water, which probably explains why this is the best known aspect of their behaviour. The adaptation to a diet which is particularly dry (see Food and Feeding) in surroundings characterized by aridity oblige sandgrouse to make regular visits to the scarce and maybe far-distant spots where surface water is available. And, as they fly to water, they emit all the while far-carrying calls that encourage others of their kind along the way to join them, with the result that at drinking places dozens, hundreds or even thousands of birds may congregate, the numbers depending on the species and the region.

These flights to water take place with marked regularity. Most sandgrouse drink in the morning, some species early, others later, with varying numbers of individuals that may return to drink in the evening. However, there are four closely related species, sometimes separated in the subgenus *Nyctiperdix*, that visit watering places after sunset and on occasions again before dawn: these are Lichtenstein's, the Four-banded, the Painted and the Double-banded Sandgrouse. Arrival times at water-holes are very precise for each sandgrouse species, in accordance with the hours of sunset and sunrise. In the Kalahari, the Namaqua Sandgrouse drinks 1-2 hours after dawn and Burchell's 2-2½ hours after dawn. In Spain, Pin-tailed Sandgrouse arrive on average 2¾ hours after dawn, but Black-bellied Sandgrouse 3 hours after dawn. These two species also fly to water in the evening during the summer,

the Pin-tailed more or less an hour and 20 minutes before sunset, but the Black-bellied about an hour before.

Apparently not all members of one community need to drink every day. Theoretical calculations of the drinking capacity on each visit, about 10-30 ml, together with experiments on withholding water from captive birds, indicate that they could manage drinking only once every few days. Research has shown that Pin-tailed and Black-bellied Sandgrouse in Morocco fly to water in greater numbers on hot sunny days than on cold misty ones; in Spain they only visit watering places regularly during the summer months. Moreover, it would seem that the Tibetan Sandgrouse, living in high altitude environments where water is not generally scarce, is an exception among sandgrouse in that it does not fly to drink in flocks.

The availability of watering places varies considerably for sandgrouse that live in a wide diversity of habitats. In true deserts, birds are frequently forced to cover long distances, maybe several dozen kilometres, although exact data are lacking; it is thought that some Burchell's Sandgrouse in the Kalahari with eggs or chicks may fly up to 80 km. The quality of the water at watering places must also differ greatly: at many pools the salinity increases rapidly through evaporation in summer. Sandgrouse prefer fresh water and appear even to "taste" the water before drinking, though on occasions they have been seen to drink highly saline water, particularly the desert-dwelling Crowned Sandgrouse. Finally, at some watering places ease of access seems to be a limiting factor: perhaps on account of their short legs, sandgrouse generally prefer open, gently sloping banks, although Lichtenstein's Sandgrouse has been recorded as flying down relatively deep wells. Nonetheless, this dependence on water undoubtedly has a profound influence on the distribution of sandgrouse over extensive desert areas: J. A. Valverde points out that in Western Sahara some Crowned Sandgrouse are reliant on the holes dug by jackals and hyenas in their quest for water just below the surface in sandy wadis.

The large gatherings of noisy birds that assemble at regular hours can not but attract the attention of certain predators, and various writers have recorded the constant presence of falcons and other raptors at watering places visited by sandgrouse. However, sandgrouse undoubtedly behave in a way calculated to evade predation: when flocks arrive to drink, they normally fly round the pool several times and then land some distance away; after a prudent lapse of time, they then run down the bank, drink quickly and nearly always take off from where they were drinking. Even so, there are species, like Burchell's Sandgrouse, that land directly on the bank or even on the water, where they are said to float well and take off easily.

Contrary to what was long thought to be the case, sandgrouse do not suck in water non-stop, but lower the bill into the water and then raise the head to swallow, at times letting some of the water trickle out at the edge. The number of swallows varies each time the birds drink, but is never very many: in the Kalahari, averages have been recorded of about nine in the Namaqua Sandgrouse and seven in Burchell's in a total time of no more than 5-10 seconds.

Away from the watering places, the daily activities of sandgrouse are not so well documented. As they are medium-sized birds that feed on small, at times minute, seeds, they must spend most of their available time picking these up off the ground. A recent study involving three species, carried out in Spain and Israel, shows that 49% of the time budget is spent foraging, as opposed to 26% spent idling, 9% given up to preening and 8% to flying, with less than 1% taken up by social behaviour.

The activities of sandgrouse are carried out almost entirely on the ground and, owing to the shortness of their legs, very near the surface, in precisely the hottest layer of air, where at certain times of the year and hours of the day, temperatures often exceed 40°C or even 50°C. It must also be remembered that arid environments not only give rise to high daytime temperatures but also, owing to the clear skies, dry air and scant nature of the

Unlike other congeners, Lichtenstein's Sandgrouse shuns cultivated areas and flat open desert with little or no vegetation. Instead, it prefers scrub-covered rocky slopes, wadis, or clearings in thornbush. In Africa, it shows a liking for acacia and is often to be found in patches of these trees or shrubs, or near other plant species that offer shade where it can rest during the hottest hours of the day. It is heavily dependent on water, frequently flying considerable distances to drink twice a day.

[*Pterocles lichtensteinii*, *lichtensteinii*, Danakil Desert, Ethiopia. Photo: Gertrud & Helmut Denzau]





The Painted Sandgrouse, a species confined to the Indian Subcontinent, is less gregarious than other members of the family. It is usually observed in twos or threes foraging during the day, and even on the way to traditional watering places flocks are small. Relying heavily on its cryptic plumage to protect it against predators in the daytime, a bird crouches when alarmed and may be approached very closely before finally flying up. When disturbed, this species flies low and comes to land only a few hundred metres away, unlike other species which take care to fly out of sight.

[*Pterocles indicus*,
Ranthambore, India.
Photo: David Hosking/
FLPA]

vegetation, they suffer rapid heat loss and low temperatures during the night. There must be few birds that are called upon to endure such marked extremes of temperature as sandgrouse habitually have to withstand. For this reason, they are provided with dense feathering, even covering both the base of the bill and the tarsi, along with a whole series of other physiological and behaviour-related adaptations.

With regard to the physiology of thermoregulation there are interesting aspects of these birds that have been studied by D. H. Thomas and S. A. Hinsley among others. On the one hand, sandgrouse possess basal metabolic rates that are lower, for their size, than allometric equations might lead one to suppose: 46% lower, for instance, in the Double-banded Sandgrouse. This allows a relative reduction of endogenous heat production and, as a result, of the need for refrigeration. In addition, it implies fewer demands on energy, which can be an advantage in unproductive deserts. On the other hand, sandgrouse show highly deviating ranges of thermoneutrality, with a tendency towards the upper temperature spectrum: if in most bird species the thermoneutral zone usually stretches from 18°C up to 33°C, in the case of the Double-banded Sandgrouse, for instance, the lower critical temperature is 32°C and the upper at least 43°C. This means to say that it is between these limits when the species, typical of hot semi-deserts, feels normal, whilst above or below them it must use thermoregulatory mechanisms in order to maintain a constant internal temperature.

At high ambient temperatures the normal process of thermoregulation is through water evaporation. This usually takes place through the skin; it is only very rarely, when temperatures are exceptionally high, that one sees sandgrouse performing the gular-fluttering that is commonly observed in some other birds. Sandgrouse appear to possess a greater capacity to cool off than other desert birds: in the Double-banded Sandgrouse, for example, at 40°C the rate of evaporative heat loss is equal to 115% of the rate of metabolic heat production; while in the passerine Tristram's Grackle (*Onychognathus tristramii*) it would be equal to 109%, in the Spinifex Pigeon (*Geophaps plumifera*) to 100%, and in the Sand Partridge (*Ammoperdix heyi*) to 51%. However, owing to the thermoregulatory mechanism they employ, this obliges sandgrouse to expend a considerable amount of water, a fact that seems strange at first sight in birds adapted to aridity,

and that only begins to seem reasonable when one remembers that by their very nature they are forced to drink, and in turn they are only able to drink thanks to their excellent powers of flight and other adaptations related to the exploitation of water that have already been discussed. In other granivorous birds of arid regions, in the case of the much studied Budgerigar (*Melopsittacus undulatus*), for instance, the strategy of managing to do without water prevails so that, quite the reverse of what operates in sandgrouse, low rates of water loss through evaporation occur together with comparatively high metabolic rates that encourage the endogenous production of water from the birds' food.

Yet this excellent adaptation of sandgrouse to heat has its counterpoint at low ambient temperatures since, in the Double-banded Sandgrouse, as soon as the temperature drops below 32°C thermogenesis must begin, demanding a corresponding expenditure of energy. However, in sandgrouse generally, there would seem to be a scale concerning their greater or lesser adaptation to heat or cold. Thus, in the Black-bellied Sandgrouse, the *Pterocles* species with the most northerly range, the metabolic rate when the bird is inactive is similar to that which can be predicted allometrically; the lower critical temperature has been fixed at 28°C and the internal temperature proves to be relatively unstable, capable of dropping from the usual 41°C to only 37°C when the ambient temperature is 10°C, in this way reducing the thermic differential between the inside and outside of the body and allowing energy to be saved. It would be extremely interesting to study these aspects in the two *Syrhaptes* species that inhabit cold environments.

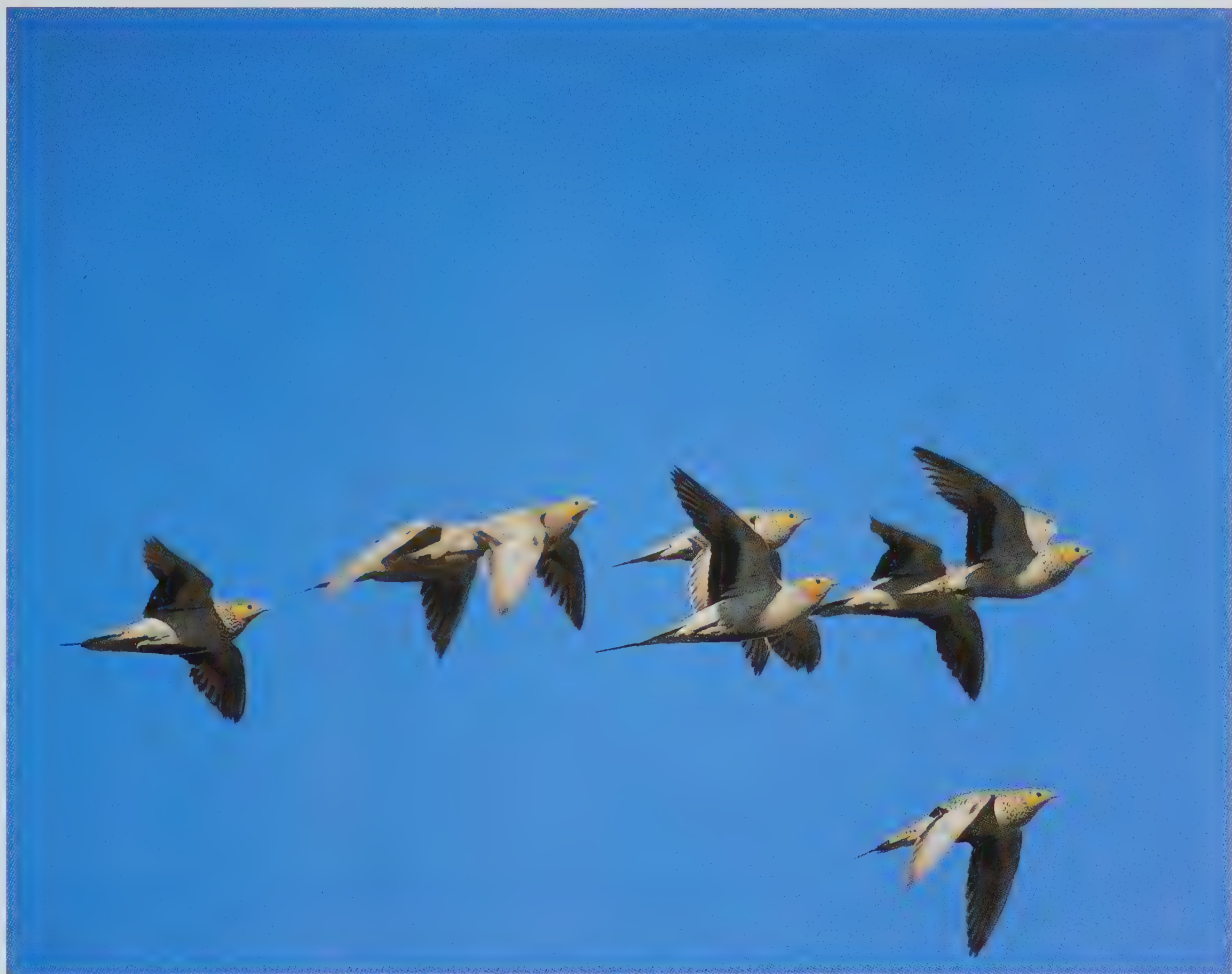
The thermoregulation that is exercised through behaviour in any case is more economical than that depending on physiology, as it allows for saving of water in hot conditions, and of energy in cold weather. In this sense it has been said that sandgrouse behave somewhat like cold-blooded, heliothermic reptiles. For instance, they bask in the sun in the early morning hours or in the winter sun on cold days; they avoid overheating by flying to water during the relatively cool morning hours, in the evening or even at night. In the hot mid-day hours they remain inactive, if possible in the shade of clumps of vegetation or bushes; to help alleviate the cold at night they huddle up closely together.

As part of so-called comfort behaviour, sandgrouse take frequent dust-baths, when they roll on their backs and often lie with

Highly gregarious, most sandgrouse associate in small parties and flocks when foraging and particularly when flying to water. Though inconspicuous and normally silent on the ground, on their way to drink in the early morning, like these Spotted Sandgrouse, they call constantly, attracting others on the ground to join them, so that several hundred may arrive at the water-hole almost simultaneously. Flight is direct and swift; it has been stated that Spotted Sandgrouse are capable of outflying a Lanner (*Falco biarmicus*) in level flight. As they approach water sandgrouse are circumspect: flocks will usually circle round or pass overhead several times before landing, often at some distance from the water, where they wait warily. If the coast is clear they fly down to the water's edge and proceed to drink, like the Yellow-throated Sandgrouse here. Having drunk, they will depart directly from the water in pairs and small groups to fly off to their feeding grounds. Several species fly directly down to water, even alighting on it, prior to drinking. If prevented from drinking at the watering place, flocks have been observed to wait at a safe distance for some considerable time until the danger is over, and they may even forage in the meantime.

[Above:
Pterocles senegallus,
Montasar, Oman.
Photo: Hanne & Jens
Eriksen/Aquila.

Below: *Pterocles gutturalis*
gutturalis, South Africa.
Photo: Warwick Tarboton/
Natural Science Photos]



their feet in the air. However, they never seem to bathe, despite their daily visits to water. They preen their feathers regularly, smoothing them down with oil from the uropigial gland; and they scratch their heads indirectly, over the wing, as do waders but never pigeons.

Contrary to what has sometimes been said, sandgrouse, or at least certain species of sandgrouse, do form communal roosts at night. From the little that is known about this habit, it appears that they have a preference for completely open sites; that they scrape little hollows to lie in; and that, occasionally at least, small numbers of birds will snuggle up close together.

Voice

The most obvious vocalizations made by sandgrouse are the contact calls given in flight, especially when they are on their way to or from water. A strange case is the loud whistle of Pallas's Sandgrouse, which is not vocal in origin at all, but is produced in flight by the narrow, curiously elongated outermost primaries.

As a general rule, calls are loud, they consist of one to three syllables, and they are repeated at short intervals. Transcription is not at all easy, but the calls of the Pin-tailed Sandgrouse have been rendered as "khattar-khattar", those of the Black-bellied as "churr-churr-ur", and those of the Spotted as "quitoo-quitoo-quitoo". These characteristic, unvarying calls are an invaluable aid to identification in the field and when heard in the far distance alert an observer to the presence of birds that might otherwise go undetected. They frequently give rise to popular names such as "Uak" for the Tibetan Sandgrouse in Tibet, "Wurwulli" for the Four-banded Sandgrouse in Nigeria, and "Kelkiewyn" for the Namaqua Sandgrouse in South Africa, this last having the additional meaning of "wine glass" in Afrikaans. The scientific name for the Pin-tailed Sandgrouse, which comes from the Arab word *khata*, is also onomatopoeic. At times, names that are very similar arise from regions geographically far apart, such as "Chûr" in Pakistan and "Churra" in Spain, both designating the Black-bellied Sandgrouse.

The other calls have generally been little studied. Calls are made on take-off by birds that have just been drinking. There are also calls clearly expressing alarm given by birds as they are

frightened off the nest. When birds are active on the ground, their calls are usually low in tone and somewhat clucking in nature. They include contact calls; calls expressing warning; those used to distract attention; or those to call up chicks that have hidden themselves away. For the chicks themselves, as in other nidifugous birds, distress and contentment calls have also been described.

Food and Feeding

One of the key aspects of the biology and ecology of the sandgrouse is their adaptation to seed-eating, which they share with other groups of birds that inhabit arid environments. Though information on this subject is rather scanty, seeds seem to form the basis of their diet throughout the year, supplemented only to a small extent by leaves, shoots and other green matter. Remains of insects and other animal matter are found very occasionally in the crop or stomach of a sandgrouse, but it could be that they are swallowed incidentally. In the Etosha National Park, in Namibia, the pieces of snail-shell found in female Double-banded Sandgrouse crops could be the result of a search for calcium to help in the formation of eggs, but they might also have been swallowed for grit.

Several different species are rather selective in their choice of food. In existing studies, what is remarkable is the relatively low diversity of seeds taken at each locality and the preponderance of just a few plant families. For instance, 41 Spotted Sandgrouse from Western Sahara that were examined were found to contain seeds from only half a dozen plant species, two of which were extremely plentiful; again, 21 Pin-tailed Sandgrouse collected in central Spain in winter yielded only 19 plant species, of which 12 were Leguminosae and two Chenopodiaceae; and in the Namibian Desert, the Namaqua Sandgrouse only seems to make use of the seeds of seven species, the most important being one of Leguminosae and two of Capparidaceae.

On occasions, a seemingly very specialized diet can be explained simply by the great local abundance of a certain plant. At one spot in Morocco, for instance, the Spotted Sandgrouse fed almost exclusively on the spurge *Euphorbia guyoniana* (Euphorbiaceae) and at another on the asphodel *Asphodelus*



A Black-faced Sandgrouse, squatting in a hollow it has made in the loose sandy topsoil, initiates a dust bath. This habit, frequent in sandgrouse, often involves the bird turning on its sides with both feet in the air, or even rolling on its back to rub dust into the plumage. Dust baths may help in feather maintenance, presumably serving to rid the feathers of parasites and surplus preen oil. Before and after transporting water in their belly feathers for the chicks to drink, male sandgrouse often dust-bathe, perhaps to dry the plumage. Sandgrouse are not known to bathe in water, though they do enjoy standing in the rain.

[*Pterocles decoratus* ellenbecki, Samburu, Kenya.
Photo: Denis Huot/Bios]



Open steppe country with scattered shrubs or sandy savanna with denser vegetation, as in the Kalahari, both offer suitable habitat for the Namaqua Sandgrouse, a species well known for its gregarious habits. In the evening, flocks that have fed together during the day fly to stony ground, like the birds seen landing here, and each individual will make a shallow scrape in which to roost for the night. Next morning, 1-2 hours after sunrise, all the birds in the area will fly to water, often covering up to 60 km to reach it. Small flocks will be joined by others so that many hundreds may arrive almost together. The first birds usually land some distance away and, after waiting half an hour, fly down to drink; later birds land closer and drink sooner. Eventually, vast numbers may gather, up to 20,000 birds at times, which can lead to considerable jostling at the water's edge, where drinking normally lasts only 10-15 seconds per individual. This frequently spectacular collective behaviour offers some degree of protection against predators, and may help to spread information concerning the location of good feeding areas.

[Above:
Pterocles namaqua,
Etosha, Namibia.
Photo: Günter Ziesler.



Below:
Pterocles namaqua,
Namib Desert Park,
Namibia.
Photo: M. P. Kahl/DRK]



Madagascar boasts an endemic species of sandgrouse which occurs in open wooded plains and savanna-type country. It is seen in small groups of up to 30 birds, flying at times as much as 100 m above the ground. It frequents rivers, ponds and lakes to drink in the early morning, sometimes remaining on sandbars to roost during the day. Flight in sandgrouse is always strong and fast, and birds are capable of maintaining a cruising speed of 60-70 km/h, enabling them to cover long distances quickly and easily, on their regular daily visits to drinking places. In flight, they often form close-knit flocks.

[*Pterocles personatus*,
Madagascar.
Photo: Roland Seitre/Bios]

tenuifolius (Liliaceae). But in other cases the search for certain specific plants seems obvious: for instance, Lichtenstein's Sandgrouse selects *Acacia* (Leguminosae) seeds to such an extent that its distribution in the Sahara may be conditioned by the distribution of *Acacia sayal*.

The preference for plants of the Leguminosae (or Fabaceae), in particular, appears very widespread and must be linked to the high protein content typical of these plants, which associate in symbiosis with nitrogen-fixing bacteria. The legume *Tephrosia dregeana*, for example, to which the Namaqua Sandgrouse is very partial, has been found to contain 32% crude protein. *Tephrosia*, like *Astragalus*, *Indigofera*, *Melilotus* and others, is amongst the genera of Leguminosae that recur frequently in different species and in far-distant areas. There are also other families that seem to be particularly sought after, such as Chenopodiaceae (*Salicornia*, *Salsola*, *Lophiocarpus*), Polygonaceae (*Polygonum*), Cruciferae (*Artemisia*, *Sisymbrium*), Liliaceae (*Allium*, *Asphodelus*) or Boraginaceae (*Heliotropium*). On the other hand, grasses (Gramineae or Poaceae) are rarely as important as one might imagine, given their wide distribution and abundance. In the business of food selection it is very probable that factors other than that of protein content play their part, factors such as the energetic value, the presence of trace elements, the quantity of toxins or the hardness and relative size of the seeds; indeed, it is worth noting that minute seeds are sometimes taken, and there are records of several thousand being found in a single bird's crop.

Some species of sandgrouse feed on cereals or cultivated legumes, and in some Black-bellied Sandgrouse wintering in the Thar Desert, 39% of the food in bulk was found to be made up of pulses (*Phaseolus*), while in Spain both this species and the Pin-tailed Sandgrouse eat large quantities of grain, at least seasonally. In the region of La Mancha in central Spain, some Pin-tailed Sandgrouse shot in January were found to have eaten only seeds from wild plants, whereas for others taken in summer 50% of the food in weight was made up of the grains of oats (*Avena*), wheat (*Triticum*), barley (*Hordeum*) and rye (*Secale*), with lentils forming another 16%.

Sandgrouse pick up most of their food off the ground, although at times they will pluck it straight from the plants; they will even pull grain out of the ears of growing corn, if they can.

Foraging for seeds, often very small ones, would certainly seem a little like hard work, made all the harder by the cryptic colouring that seeds often show. Here again, in methods of feeding there could be differences: in an area of southern Africa where the two species are sympatric, the Double-banded Sandgrouse is said to forage slowly and rather cautiously, while the Namaqua Sandgrouse covers large areas foraging in a somewhat hurried fashion.

In order to help with the digestive process, sandgrouse take in grit, which at times may make up a considerable proportion of the weight of the gizzard, with a figure of 43% recorded for the Pin-tailed Sandgrouse in Spain. They have also been observed to ingest crystallized salt and to eat the leaves of certain halophytic plants, such as *Mesembryanthemum*, which have a high salt content. This is quite remarkable, given that sandgrouse prefer to drink fresh rather than brackish or salt water (see General Habits).

Breeding

A brief summary of the breeding biology of sandgrouse could be made as follows: they are monogamous; they breed in isolated pairs or loose colonies; they nest on the ground; their clutches consist of three eggs; these are incubated by the female during the day and by the male at night; the chicks are nidifugous and able to feed themselves, but they are attended and protected by both parents, the male having the additional task of bringing them water; and, finally, productivity is low, with an annual average of only one or two chicks per pair.

The monogamous nature of sandgrouse became apparent when birds were first observed in captivity at the end of the nineteenth century. A. E. Brehm pointed out that the male paid his attentions to just one female and E. G. Meade-Waldo tells of a female that bred for eleven consecutive years, only changing mate when the male died, which happened twice. Also, in the wild, pairing was thought to be long-lasting, as suggested by observations of feeding or drinking flocks, in which at any time of the year the existence of pair-bonds was obvious.

This segregation into pairs within flocks is a notable feature in sandgrouse. As the breeding season draws near, flocks show



Sandgrouse are heavily dependent on water for drinking: they lose water from evaporation through the skin and this loss is not offset by moisture derived from their mainly dry diet of hard seeds. Hence, they are forced to make the daily visits to water that are such an outstanding feature of their behaviour. Originally there was much controversy over how sandgrouse drink. It was long asserted that they drank like pigeons, by sucking in water through the bill continuously without raising the head. Only in the 1960's did careful observers start to point out that this was in fact not the case. They suck water into the mouth but then they do raise the head to gulp it down. A Chestnut-headed Sandgrouse has waded quite deep into the water and submerged its bill and face up to eye level; then it raises its head and body right out of the water to facilitate the act of swallowing. The number of times these actions are repeated varies, but the whole drinking process may take no more than 10 seconds.



[*Pterocles exustus*,
Yalooni, Oman.
Photos: Hanne & Jens
Eriksen/Aquila]



A few Burchell's Sandgrouse take advantage of some temporary rainwater pools to drink, maybe thereby avoiding a much longer flight to the regular source of water. This species may make a round journey of 150-160 km to find water in the Kalahari, a prodigious distance to cover on a daily basis. Not only does water availability vary with the season and type of habitat, but so too does the quality. At many water-holes the water becomes increasingly saline through evaporation, as the dry season advances. Sandgrouse prefer fresh water, which may account for the attraction of this recently inundated ground.

[*Pterocles burchelli*,
Kalahari National Park,
South Africa.
Photo: Anthony Bannister/
NHPA]

an ever-increasing tendency to break up, until the moment arrives when each pair begins to live apart. Nonetheless, a certain group relationship seems to persist, and this has led several authors to talk of semi-colonies or loose colonies, in the case of some of the few species for which the breeding cycle is fairly well documented. Thus, occupied nests only 4 m apart have been recorded for Pallas's Sandgrouse, 6 m apart in the Pin-tailed Sandgrouse, and slightly more than 20 m apart in the Namaqua Sandgrouse. At drinking times, the members of these groups, or at least those not looking after eggs or small chicks, also seem to fly off all together to the water-holes. The maintenance of a certain degree of gregariousness would be very much in keeping with the fact that sandgrouse remain strictly granivorous during the breeding season, while the scattered nature of the nests could be regarded as a strategy to reduce the risk of predation, as also seen in some terns, for example. Monogamy could be accounted for by the great contribution that males have to make in the breeding tasks.

Pair displays are rather sketchy and unspectacular, in keeping with the general line of sandgrouse behaviour. In the Pin-tailed Sandgrouse, male courtship seems to consist of holding the head low, the wings somewhat away from the body, and the tail raised and fanned out; before copulation the male approaches the female holding his legs very stiff and straight and his body erect. For the Namaqua Sandgrouse, a strutting display has been described, when the male runs after the female with his tail fanned out and his head held tucked into his body; sometimes it is the female that does the chasing. Captive Double-banded Sandgrouse have been seen to give a curious post-copulation display, during which the male, after pursuing the female for a short distance, stands erect on very straight legs, with his breast puffed out and his wings fully extended on both sides, striking a kind of heraldic pose, which he can hold for about 30 seconds.

On the other hand, some species give aerial displays which, in the Pin-tailed Sandgrouse at least, can be quite spectacular. In this species, they take place at fairly regular times of the day, normally mid-morning or towards late evening, and through-

out the year, albeit more frequently during winter or spring before the flocks begin to disband. For 5-10 minutes the flock flies around in circles at some considerable height and speed. Then small groups or pairs gradually begin to spin off and, calling all the while, they wheel around interweaving, at times joining up again into larger groups, while from time to time some birds in twos and threes perform lightning headlong dives in close formation. In the possible ethological role played by these flight displays, it is not difficult to imagine two components, namely social cohesion and the pair formation or bonding, both elements consistent with monogamy and a loosely colonial character.

The breeding season seems timed to coincide with a relative abundance of food in the form of seeds, which in turn is logically bound up with the timing of the rainy seasons, especially in regions where the climate is drier or subject to marked seasonal change. The most northerly species breed relatively late, much later than most other sedentary birds. Thus, in Spain, a country with a semi-arid Mediterranean climate, both the Pin-tailed and Black-bellied Sandgrouse lay mainly in June, after the spring rains and the flowering period, once there are plenty of seeds available. Obvious differences in latitude account for the fact that in north Africa and the Middle East these and other sandgrouse species begin laying, on average, somewhat earlier, from April or May. In tropical parts of Africa and India they generally nest in the dry season; in Tanzania, the Chestnut-bellied and Black-faced Sandgrouse lay from May to August. In southern Africa, the degree of variation seems even greater, and in the Namaqua Sandgrouse, for instance, there are records of nests with eggs in almost every month of the year, although there again most of the records relating to this and other species occur in the driest part of the year, from April to October. All of this leads to a certain contradiction, in that the Palearctic sandgrouse breed in their summer while the southern African species do so in their winter. By breeding in the local winter, the Namaqua Sandgrouse in Namibia is said to be able to take advantage of the comparatively cooler months, when average maximum tem-

Famous for its sporadic irruptive movements into Europe, Pallas's Sandgrouse is a lower altitude bird than its Tibetan congener, encountered on the open steppes of central Asia but avoiding vast expanses of waterless desert. Like most other sandgrouse species, it must be within daily flying distance of a source of water, but these flights are not so precisely timed as in most sandgrouse, and may take place any time from 06:00 to 10:00 hours; another drinking session may occur about sunset. Typically the birds will circle the watering site before landing, but after drinking, at times they spend several hours nearby, interspersing more drinking with bouts of feeding and loafing.

[*Syrrhaptes paradoxus*,
Mongolia.

Photo: Gertrud & Helmut
Denza)]



peratures do not exceed 49°C, since in the hottest months from October to April the top daily temperatures ranging from 54°C to 59°C would prevent the embryo from developing. Yet it seems probable that in general the temperatures are not as important as the rains: further south in the southern part of Cape Province, where the climate is Mediterranean and rainfall is heavy in winter, the Namaqua Sandgrouse nests during the summer, just like the sandgrouse of the Palearctic.

Sandgrouse nests can scarcely be called nests, for they are merely very shallow scrapes or existing hollows in the ground, quite often hoofmarks. Indeed, in Iraq 15 out of 23 Pin-tailed Sandgrouse nests, and four out of five Spotted Sandgrouse nests, were sited in camel footprints; in most of these cases no nesting material whatsoever was used, while in others small stones or wisps of grass were found around the nests or inside the hollow. In fact, Namaqua Sandgrouse use just such material in their incubation change-over ceremonies. The diameter of the nest varies, depending on the body size of each species, but the range is roughly 10-14 cm. Sometimes nests are completely in the open, but at others they are close to tufts of vegetation, clumps of grass or rocks, with frequencies that appear to differ according to the species and that probably have adaptive value, since an increase in the crypsis of the incubating bird could be involved. In one part of Spain, Black-bellied Sandgrouse were found almost always to place their nests in the open, while Pin-tailed concealed them among dry grass, thistles or stones. Again, in Morocco, Spotted Sandgrouse nest in the open, but among stones similar in size to a bird crouching on the ground. It is only in some species, namely those of the subgenus *Nyctiperdix* (see Systematics), that nests have been detected actually beneath clumps of vegetation or bushes.

Clutch size remains remarkably constant: in all species it appears to consist normally of three eggs, occasionally two, and only exceptionally have some species been found to lay clutches of four. The eggs are ellipsoid, equally rounded at both ends. In most species average length is 33-48 mm, and width 24-32 mm. The weight of a newly laid egg is some 23 g in the Pin-tailed and 26 g in the

Black-bellied, so that the total weight of the clutch represents more or less 20% of the female's weight. The smooth, glossy eggs are very cryptically coloured, as one would expect in ground-nesting birds, with background colours that range from sandy or pinkish buff to olive grey; they are heavily marked with grey or mauve blotches overlaid with lighter or darker brown blobs.

The eggs are laid apparently at intervals of 24-48 hours, so that some species may complete the clutch in three days and others in four or five. Although opinions are divided, it is very likely that incubation proper does not begin until the clutch is complete, as hatching tends to be synchronous, another typical feature of ground-nesting birds with nidifugous chicks; the first eggs to be laid are probably covered at intervals to protect them from too much sun during the day or from the cold at night. Both sexes develop brood patches, and the sexes take turns in incubating, the males at night, and the females, with their more cryptic colouring, in the daytime. In fact, males usually incubate from just before nightfall until several hours after dawn, in the Pin-tailed and Black-bellied Sandgrouse from about an hour before sunset until four hours after sunrise, so the males work comparatively longer hours than the females. For instance, male Namaqua Sandgrouse incubate some 14 hours during the summer and up to 18 hours where they breed in the winter. This disparity is necessary to allow the females enough time to feed and visit the water-holes.

Such long shifts may help to reduce the number of change-overs at the nest. Change-overs always imply the risk, predictably greater in open environments, of disclosing the site of the nest to predators. Probably for this very reason, the birds perform the change-overs unobtrusively; the bird taking over lands some distance away and creeps up to the nest, while the bird being relieved gets up and walks a few metres away when it sees that its mate is near, before flying off. Nonetheless, a "Side-throwing Ceremony" has been described in the Namaqua Sandgrouse, in which the bird throws small stones and other objects to one side using its bill, a ritual performed mainly by the bird that is being relieved at the nest.



The diet of all sandgrouse consists largely of small, sometimes very tiny, hard seeds picked up painstakingly off the ground, or less often plucked directly from plants. Seeds are consumed throughout the year, supplemented at times by leaves, shoots and other green matter. Surprisingly, the seeds of comparatively few plants are used by each sandgrouse species. Lichtenstein's Sandgrouse, for instance, shows a marked preference for acacia seeds, when available, especially those of *Acacia sayal*. It is reported to forage chiefly in early morning and towards the evening.

[*Pterocles lichtensteinii* *sukensis*, Buffalo Springs Nature Reserve, Kenya. Photo: Dave Richards]

During incubation, only rarely will a sitting bird leave the eggs, if it becomes aware of danger; at certain times of day the eggs would not survive prolonged exposure to the sun. When people or potential predators approach, even if the bird sees them coming from some distance away it usually slips off the nest, but sometimes, caught unawares or when the danger does not appear too serious, the bird can be approached very closely before it finally flies off, calling loudly as it goes. Otherwise, while it incubates it remains virtually motionless, only making very slight movements to help alleviate the tremendous heat that the females in particular must endure on the frequent occasions when the air temperature exceeds 45°C or even 50°C. Then, probably to facilitate heat loss by evaporation, they can be seen to ruffle up the neck or back feathers, or perform gular-fluttering; if there is a chance, they may face the wind and droop their wings to ventilate the thinly feathered axillary areas.

From the time the last egg is laid, the incubation period normally lasts 20-25 days for most species where information is available. Hatching takes another one or two days. Afterwards the parents pick up the eggshell fragments in their bills and throw them away a few metres from the nest. The chicks, which are fully precocial, leave the nest as soon as the last one to emerge is dry. Newly hatched Pin-tailed Sandgrouse chicks weigh about 17-18 g, and Black-bellied Sandgrouse chicks about 20 g. Their downy plumage is, as one might expect, very cryptic, but it is also pretty and unusual, with dark-edged white lines running round brown, "window-like" patches on the back. This general pattern is softened or less distinct, however, in some species, namely the Lichtenstein's, Painted, Crowned and Spotted Sandgrouse, perhaps as an adaptation to desert environments where there are few contrasting colours to be found on the ground. Similar colour patterns exist in some waders (see Systematics), particularly in coursers, birds that also live in arid environments and may prove to be fairly closely related to the sandgrouse.

When only one day old, the chicks can feed themselves, eating seeds in the same way as their parents. Nevertheless, not only do their parents take them to the right places, but they also make them undergo a form of training by showing them where they must forage, by pecking on the ground themselves, or even by picking up seeds in their bills and then throwing them down on the ground again. The chicks, for their part, follow their par-

ents closely; when only two chicks are left, which seems to happen rather regularly, one walks behind the male and the other behind the female. As is normal in most birds, the chicks' thermoregulation mechanisms are far from perfect during their first few days, and so, when it is hot, they take advantage of the shade offered by their parents, by sometimes walking between their legs. At night-time too, they sleep tucked up close to them, for as much as ten days in the case of Pin-tailed Sandgrouse bred in captivity. The parents always seem to be fussing after the chicks and, if necessary, they will defend them, sometimes pretending to have a broken wing in the same way, once again, as seen in many Charadriiformes. To begin with they do not even leave them alone when it is time to drink; they go to water in turns, typically the female first and only then the male, the one that must bring water for the chicks to drink. Only later will the pair fly off to water together, while the chicks remain crouched under the shade of a bush.

How water is brought to the chicks is perhaps the most surprising and most written-about aspect of sandgrouse breeding behaviour. It is curious too that although the truth was discovered at the end of the last century, it was not generally accepted until fairly recently. In 1896, Meade-Waldo published an account in *The Zoologist*, that was both lively and accurate, of how a male Pin-tailed Sandgrouse entered a drinking pool, saturated his belly feathers with water and then proceeded to run back to his recently hatched chicks, whereupon they crept beneath him and sucked at his feathers. In several later works, up to 1922, Meade-Waldo continued to insist on the reality of this phenomenon, which had been observed in other species by other bird-fanciers, such as St Quentin who had seen it in the Chestnut-bellied Sandgrouse. However, for some strange reason it was repeatedly asserted that the whole story was pure fantasy and that one could only go as far as saying that sandgrouse might possibly regurgitate like other birds. This state of affairs continued until, in July 1960 near Baghdad, Iraq, S. Marchant happened to observe a male Spotted Sandgrouse in the wild giving water to his two chicks. The following year, the same author made a similar observation, but this time of a Pin-tailed Sandgrouse, and then a few years later T. J. Cade and G. L. Maclean published a comprehensive study about the Namaqua Sandgrouse, which cleared up the matter once and for all.

All sandgrouse are monogamous.

Observations of sexual displays are few, suggesting that such behaviour is limited and very low key, as is consistent with their inconspicuous nature.

For the Namaqua Sandgrouse only one type of sexual display has been described: the male struts after the female with his raised tail fanned and his head drawn in to his shoulders. At times the roles are reversed and the female pursues the male.

Prior to copulation, the female may show her willingness to mate merely by adopting a submissive posture.

[*Pterocles namaqua*, southern Africa.

Photo: Tony Heald/BBC Natural History Unit]



Before taking water into their feathers, the males normally rub their bellies on the ground, presumably to get rid of or reduce the oily film on their feathers, then they enter the water and ruffle their ventral feathers, at the same time rocking to and fro. Sometimes they drink at the same time, though not always. When they reach the chicks they walk with their legs wide apart, instead of placing one foot in front of the other, as they normally do. They then stand in a strange, erect "Watering Posture", which allows the chicks to strip the feathers of water. While the chicks are thus engaged they look rather like a "litter of suckling pigs", as somebody graphically reported. Once they have finished drinking, the males usually rub their bellies on the ground again, perhaps this time in order to get themselves dry.

The male's belly feathers are specially adapted for carrying water. They are capable of holding up to 15-20 ml of water per gram dry weight, when the equivalent in a synthetic sponge would be little more than 5 ml. The feathers in the proximal sections have barbules without barbicels and are thus not interwoven; they are coiled several times spirally and instead of being arranged at right angles to the barbs, as is the normal arrangement, they are parallel. However, when the keratin is dampened, these barbules uncoil partially and proceed to lie at right angles to the plane of the feather vane or vexillum, so creating a special layer, a kind of felt, capable of holding water and absorbing it by capillary attraction in which an important part must be played by the hairy filament in which the barbules terminate, some tenths of a millimetre in length. Not all the water manages to reach the chicks, since some of it evaporates during flight, but at least a fair amount does. For the Namaqua Sandgrouse, it has been calculated that males can take in 25-40 ml, and that after a journey lasting 32 km and half an hour they would be able to give their chicks some 10-18 ml. If need be, they make more trips: Pin-tailed and Black-bellied Sandgrouse in Spain at times make as many as three in a day; it is frequent to see males at the watering-holes alone and not at the usual times.

In the female too, specialized feathers appear, but they cover much less surface area, which tallies with the fact that female is rarely seen to wet these feathers at the watering pools, perhaps only if the male has died, or if, as the chicks grow apace, the male's contributions need to be supplemented. Moreover, these

feathers seem to be present in all the species except in the Tibetan Sandgrouse, which is also unique amongst sandgrouse in the special nature of its habitat; it does not visit watering pools on a daily basis.

Undoubtedly this is a splendid adaptation for sandgrouse, as it allows them to breed in areas where seeds are plentiful, independent of how close to water they are. To breed near water in typically arid or semi-arid environments, and during the dry season, would involve not only facing high levels of competition for food, but also greater risks of predation, since predators tend to gather precisely at the limited number of watering places. Transporting water to the chicks in the crop would probably be a worse solution, as it would interfere with the males' own needs for water. As to how this behaviour has evolved, a precedent does exist among the Charadriiformes which may shed some light: certain plovers moisten their belly feathers on very hot days (see Volume 3, page 402) and thus help to keep their eggs or their chicks cool, although the chicks have never been observed to drink from the feathers of these waders.

At this early stage the males must devote nearly all their time to their offspring; apart from these trips to water, they must spend long hours tending them, even more time than the females. Both Pin-tailed and Black-bellied Sandgrouse males have, on average, a little more than three hours available for feeding, as against the females' five, almost exactly the opposite of what happens during incubation.

The growth of the chicks is relatively rapid. After about three weeks they are completely fledged and before the fourth week, when they are about half the adult size, they are capable of precocial flight. Until they are at least two months old they rely on the water brought by the male, perhaps because the watering-holes are not safe enough places for inexperienced fliers. Later on, the whole family flies to water and its members remain together for a variable length of time, sometimes until after the postbreeding flocks are formed.

The chicks remain dependent on the adults for so long that the possibility of second broods is slight, even if they have been suspected but never confirmed in species like the Chestnut-bellied, Spotted and Black-bellied Sandgrouse. Replacement clutches, however, do seem to occur frequently, as might be expected in birds nesting on the ground that must suffer heavy losses



A female Black-bellied Sandgrouse incubates, admirably camouflaged by the subtle patterning and colours of her plumage. The nest, a mere scrape in the ground, is prepared by both sexes using their feet. Incubation probably begins once the clutch is complete, since hatching needs to be synchronous, given that the chicks are nidifugous. Both parents share the three-week long incubation, the female sitting during the day and the male at night. In fact, the male works the longer hours, sitting until several hours after dawn, thus allowing the female sufficient time to feed and drink.

[*Pterocles orientalis orientalis*, San Martín de la Vega, Madrid, Spain. Photo: Luis Miguel Ruiz Gordon]

of eggs and chicks from predation. In captivity, sandgrouse lay replacement eggs quite normally and the distribution of nests containing eggs in the Pin-tailed and Black-bellied Sandgrouse in Spain suggests that up to three or more replacement clutches may be laid during the summer.

There is very little information on breeding success in sandgrouse. In the Kalahari, Namaqua Sandgrouse lost up to 32% of their eggs, and altogether rather less than 23% of the eggs laid succeeded in producing fledglings, with a possible average production rate of about 1.3 chicks per breeding pair. Likewise, in the area of La Serena in south-west Spain, success rates of only 0.55 chicks have been recorded for the Pin-tailed Sandgrouse and 1.05 chicks for the Black-bellied Sandgrouse. The predators that cause most egg losses are probably all members of the Canidae, for instance the bat-eared fox (*Otocyon megalotis*), the Cape fox (*Vulpes chama*) and the black-backed jackal (*Canis mesomelas*) in the Kalahari, and the red fox (*Vulpes vulpes*) in Spain. In addition, chicks fall prey to birds such as the Greater Kestrel (*Falco rupicoloides*) and the Pied Crow (*Corvus albus*) in the Kalahari, and Montagu's Harrier (*Circus pygargus*) in Spain. In any case, breeding success rates are very low, especially considering that sandgrouse are seed-eaters, birds that usually show high reproductive rates. Their low breeding success, too, is probably related with long life expectancy, due to the inferred low levels of recruitment. Yet on this count practically nothing is known, except that the adults, protected as they are by their cryptic plumage, cautious behaviour and powerful flight, seem to have barely any serious enemies, apart from perhaps a few falcons like the Lanner (*Falco biarmicus*) and the Peregrine (*Falco peregrinus*), which are seen to haunt drinking pools fairly frequently. Nevertheless, there are accounts of how a Black-bellied Sandgrouse was swallowed by a huge fish in the Tigris, and several Black-faced Sandgrouse were eaten by a crocodile in Kenya, in both cases accidents that happened while the birds were engaged in drinking.

Movements

Little is known about the migratory movements of sandgrouse, particularly because they are not often ringed. Most of the spe-

cies appear to be sedentary, or perhaps with a tendency to effect nomadic movements, but in parts of Asia that are subject to very severe winters, the populations of the two breeding *Pterocles* species are migratory, while Pallas's Sandgrouse carries out irruptive movements.

Various authors have recorded fairly significant variations in the numbers of birds present in one particular area, going as far as to talk of desertions or invasions. However, other movements can be more regular or predictable. For instance, for the Spotted and Crowned Sandgrouse in the north-eastern Sahara, different tendencies have been described. In coastal parts of Western Sahara, densities appear very high in spring and summer during the breeding season, but the arrival of the rains announce a dispersal towards the interior of the desert. On the other hand, on the high plateaux of Algeria and Morocco on the northern edge of the desert, the birds are only present from October to March, with what appears to constitute a regular wintering habit. Then again, at one locality in Morocco there were some 400 Spotted Sandgrouse breeding one year and only 80 the next, when the main food plant, *Euphorbia guyoniana*, had had a poor season. There have also been accounts of the sudden arrivals of great numbers of birds in an apparent response both to spells of warm winds, when presumably the water-holes had dried up elsewhere, and to localized rainstorms that are responsible for causing the ephemeral flowering of plants. All of this points to these sandgrouse being nomadic and opportunistic, and these tendencies are probably intensified by their outstanding flight capabilities and their gregariousness. Nomadism may certainly constitute a valid adaptive answer to the inherent unpredictable nature of these arid environments, as can be seen in other animals living in deserts and semi-deserts, including man.

The irruptive movements of Pallas's Sandgrouse could constitute an extreme example of this behaviour. There have been many years when single birds or small parties of Pallas's Sandgrouse were observed in Europe, but in the latter part of last century and early in the present one there were several great invasions at close intervals, the greatest being in 1863, 1888 and 1908, when thousands of birds were observed in a number of countries, as far west as the Faeroe Islands, Norway, Scotland, Ireland and Spain. Some birds settled and managed to breed, mainly in 1888 and 1889, in countries as far apart as Great Brit-

ain and Sweden or Poland, but finally they all disappeared, which nowadays seems the logical outcome, although at the time some people laid the blame on shooting. As to the reasons for such irruptions, there have been many suggestions, including the possible influence of sunspot cycles, but little or nothing has ever been proven. Nevertheless, it seems likely that the birds may periodically experience difficulties in finding food during extremely bad weather conditions, such as heavy snow or drought, rather than undergoing cyclical variations in population size, as can be seen in some grouse (see Volume 2, page 395).

Regular, predictable truly migratory movements are rare. In Asia, in the steppes and cold semi-deserts of Uzbekistan, Kazakhstan and neighbouring regions, Pin-tailed and Black-bellied Sandgrouse are only summer visitors. They arrive in March or April and, after breeding, leave in about October, apparently to spend the winter mainly in Pakistan and north-west India. In Africa, the Yellow-throated Sandgrouse breeds in Zambia and Botswana in the dry season, but in the rainy season it migrates as far south as the former provinces of Transvaal and Cape Province, while the southernmost populations of the Namaqua Sandgrouse are also chiefly migratory.

Relationship with Man

In comparison with the cases of many other bird groups, the degree of contact between sandgrouse and man is fairly limited, largely because of the sparseness of human populations in most arid regions. An offshoot of this is that the birds have hardly any impact on human economy anywhere, either as game birds, despite their fair size and relative abundance, or as agricultural pests, despite their seed-eating and gregarious habits.

Shooting sandgrouse is not an easy business. In regions where they are not disturbed, they allow close approach by man, seeming to rely on their camouflage and ability to fly off rapidly at the last moment. However, if they are followed, they quickly learn to escape by flying a long way away, and in their flat, open

habitat, it becomes almost impossible to surprise them within gunshot range, unless it is from inside a jeep or from the back of a camel or some other mount. Their one weak spot lies in their inveterate habit of visiting water-holes in noisy parties and at regular times. Guided by the calls and direction of their flight, hunters can easily discover the location of these water-holes, where the sandgrouse leave typical tell-tale three-toe prints in the mud around the edges, and there, in a makeshift hide, they can await the punctual arrival of the birds. It is a kind of hunting which is clearly questionable from a sporting point of view and it is not very productive either, since the sandgrouse soon decide to boycott the water-holes where they are fired at. In Rajasthan and other parts of India and Pakistan, great shooting parties were held long ago, reserved naturally for maharajahs, British governors and suchlike worthies. They were organized in such a way as to deny the birds access to all the drinking pools except one, for a wide radius around. The hunters shot mainly Black-bellied Sandgrouse, and a record number of no less than 5968 sandgrouse were shot down on two consecutive mornings in 1920, by the Maharajah of Bikaner and a dozen or so more guns at the small Lake Gajner in the Thar Desert. Quite apart from ethical and economic considerations, these shooting parties were clearly exceptional, since they were carried out on wintering concentrations of birds that actually bred over vast regions. Intensive exploitation of sandgrouse by means of shooting is not a viable proposition, because the birds are not present in sufficiently high densities and their breeding rates are very low.

In all events, sandgrouse do not appear to arouse a great deal of interest from a gastronomic point of view. The breast is very fleshy, but the meat is dark, dry and apparently not very tasty. In short, they are poor value for all the trouble it takes to shoot them. Rather strangely, in Spanish idiom, the name for sandgrouse, *ganga*, has come to mean a "bargain", exactly the opposite of poor value, perhaps because in the past it was used somewhat ironically.

In spite of the unsuitability of sandgrouse as gamebirds, there were people who thought it would be a good idea to introduce

All Sandgrouse suffer heavy losses of eggs and chicks through predation, none more so than the Namaqua Sandgrouse, a resident of the semi-desert of south-west Africa, where marauding foxes and jackals are widespread. Once incubation has begun, the sitting bird rarely leaves the nest and the change-over of partners is effected discreetly, even though this species is known often to perform a "Side-throwing Ceremony", in which the bird being relieved throws small stones to one side, with its bill. When the eggs hatch, the parent on duty picks up the shell fragments and disposes of them well away from the nest, a strategy intended to prevent predators from locating the chicks, which from then onwards are never left unattended.

[*Pterocles namaqua*,
South Africa.
Photo: Penn Lloyd]





A female Four-banded Sandgrouse crouches at the nest-site with her two chicks, so recently hatched that the second shell has not yet been removed. Once dry, the precocial chicks can leave the nest, and within no time they are able to feed themselves. Covered in intricately patterned down, they are almost undetectable on the ground, especially when they "freeze" at a hint of danger. Water is provided by the adult male which has belly feathers specially adapted for carrying water some distance in them; the chicks then drink by "stripping" the soaked feathers.

[*Pterocles quadricinctus*,
Gambia.
Photo: Michael Gore]

these birds into the arid zones of the New World, and consequently the Fish and Wildlife Service of the USA obtained some Chestnut-bellied Sandgrouse from India: the birds were caught at water-holes using clap-nets, and were released during 1960 and 1961, some 2000 birds in Nevada and some 800 in Hawaii of all places. In Nevada, the attempt ended in resounding failure, and by the end of 1962 there were apparently no birds left in the areas where they had been released. Perhaps they had been swept away by the winter rains or they could not find any suitable food; a couple of these birds were shot in the province of Sonora, Mexico. The ones in Hawaii also seemed to have disappeared quickly, but later on it was found that a few had managed to survive and breed, and in fact limited shooting was allowed in 1981.

Several species eat the seeds of cereals or cultivated legumes, and they often form sizeable flocks. Despite this, they do not seem to be considered significantly harmful to agriculture in any country. Possibly it is due to the fact that sandgrouse avoid dense or tall crops; at least in Spain, Pin-tailed Sandgrouse are seen to feed in cereal fields until the crops reach a height of about 15-20 cm, after which birds on the ground do not have adequate visibility around them, so they do not return until just after harvest, to feed on fallen grain.

Another area in which sandgrouse do not seem to have a major role is birdfancying: they are not often kept in captivity, although this is said to be easy. In fact, Pin-tailed, Chestnut-bellied, Double-banded, Yellow-throated and Pallas's Sandgrouse have all been bred in captivity, and those who have bred them prize them highly for their beautiful plumage, their resistance to extremes of temperature, parasites and diseases, but mainly on account of their nature: they become very tame and even friendly with those who look after them.

Status and Conservation

Not much is known about densities or population sizes in sandgrouse. There appear to be substantial differences among the species, but the habits of each one, whether diurnal or crepuscular, solitary or gregarious, sedentary or nomadic, must have some influence on the estimated figures quoted in the pub-

lished sources. One might suppose that the species of more arid lands, areas that in principle are less productive, should attain lower densities, but this does not appear to be the case, at least in general. For sandgrouse living in desert or semi-desert environments, like the Namaqua Sandgrouse in the Kalahari or the Spotted Sandgrouse in Morocco, tentative estimates have indicated densities of about 1-10 birds/km² in their breeding areas, naturally always zones with suitable vegetation cover which are not too far from a water-hole. In environments that are not so arid, in different types of vegetation in Uzbekistan, densities of Black-bellied Sandgrouse were found to be 1-33 birds/km². In the La Crau region of southern France there was an average density of 1.6-1.7 pairs/km² of Pin-tailed Sandgrouse; and at La Serena in Spain averages of 1.3 birds/km² were recorded for the Black-bellied Sandgrouse and of 3.7 birds/km² for the Pin-tailed Sandgrouse.

In any case, most, if not all, species seem to be reasonably common over most of their ranges, which vary from extensive to very extensive, with the sole exception of the Madagascar Sandgrouse. In the main, their habitats do not seem either to be subject to drastic changes that might compromise their conservation in the long or medium term. The tree-felling and overgrazing that are unfortunately so widespread in the arid and semi-arid regions of Africa and southern Asia may be harmful to the habitats of certain species in some areas, but it is more than likely that they are helping to create suitable habitats elsewhere, to the detriment, naturally, of those birds which are less tolerant of desert conditions. Some human activities may even benefit sandgrouse. For example, the sinking of wells and the construction of pools for irrigation purposes, or to provide water for cattle or game, seem to have brought about an expansion or a population increase of sandgrouse in various countries. In addition, many species find marginal crops to be an important source of food.

Nevertheless, in certain areas man has a negative influence on sandgrouse conservation, and not only on account of overhunting. The introduction of irrigation has meant that, in the same way as the Little Bustard or the Stone-curlew (*Burhinus oedicnemus*), the Black-bellied Sandgrouse has disappeared from vast stretches of the plains in north-eastern Morocco and the same must have happened in many other areas. In Egypt, the endemic

A female Lichtenstein's Sandgrouse sets off to forage, closely followed by her two highly mobile chicks. The parents do not feed the chicks directly, but demonstrate how to feed by pecking at the ground themselves and even by throwing down suitable seeds in front of the chicks. Parental care by both adults is most assiduous, and initially they take turns to fly to water so that one parent is always left on guard. The chicks grow rapidly, and by the fourth week, at half the adult size, they are capable of weak flight. However, they continue to depend on the male for water for about two months.

[*Pterocles lichtensteinii*
sukensis, Yabelo,
Ethiopia.
Photo: Göran Ekström]



race *floweri* of the Chestnut-bellied Sandgrouse, which used to be common in the Nile Valley between Faiyum and Luxor, is now very likely to be extinct, with the last sightings dating from 1979.

The status of the two species that occur in western Europe is also worrying, and on a regional basis the Black-bellied is classified as vulnerable, while the Pin-tailed is considered endangered. In France, the Pin-tailed Sandgrouse has disappeared

Although some sandgrouse species are locally in decline, no species is considered to be threatened. Most still seem to be reasonably numerous over large portions of their often immense ranges, and even the Madagascar Sandgrouse, the most restricted of them all, is considered quite common in the west and south of its namesake island, to which it is endemic.

[*Pterocles personatus*,
Isalo, Madagascar.
Photo: Jordi Sargatal]



from most of its former range along the Mediterranean coast and now only 170 pairs remain in the region of La Crau, which covers an area of barely 10,000 ha, and which to date does not enjoy much protection. At the same time, in Spain, the numbers of both these species have dwindled dismally or they have become locally extinct: the Black-bellied has virtually disappeared from Catalonia and the Pin-tailed has gone from the area of Murcia and most of Andalucía. The fundamental reason behind these decreasing numbers can nearly always be found in recent changes in farming practice. Sandgrouse survive where farming is still based on cereal growing without the help of irrigation, where a considerable percentage of fields are left fallow, and much uncultivated land is grazed by sheep. They become rare or extinct in all those places where irrigation is undertaken, or which are converted into vineyards, or almond or olive groves, or where quite simply the rainfall is sufficient to allow traditionally fallow ground to be cultivated with the aid of fertilizers. Thus, in the same way as is happening to other birds inhabiting steppe lands originally covered in forests, the sandgrouse may end up being driven out of Europe, paradoxically, by an intensification of those same economic activities that long ago brought about their expansion of range and increase in numbers, when man turned forests into pastures and cultivated land.

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PLATE 1

Genus *SYRRHAPTES* Illiger, 1811

1. Tibetan Sandgrouse

Syrrhaptes tibetanus

French: Syrrhapte du Tibet

German: Tibetflughuhn

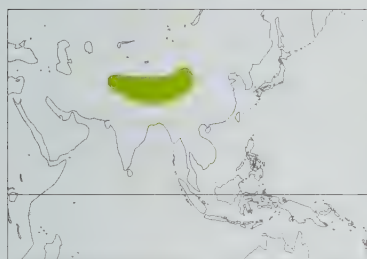
Spanish: Ganga Tibetana

Other common names: Mountain/Tibetan Three-toed Sandgrouse

Taxonomy. *Syrrhaptes tibetanus* Gould, 1850, Tso Morari Lake, Kashmir.

Birds from the Pamirs formerly separated as race *pamirensis*. Monotypic.

Distribution. Tibetan plateau, W to Kashmir and Pamir Mts. N to mountains of Astin Tagh and Nan Shan, E to Qinghai and NW Sichuan.



Descriptive notes. c. 40 cm. Front toes feathered, hind toe lacking; long, pin-like central tail feathers. Sides of head and throat orange-yellow, contrasting with finely vermiculated neck and upper breast; bill bluish in male, greyish in female. Differs from *S. paradoxus* most noticeably in having white belly and dark underwing. Juvenile similar to female, with less yellow on sides of head.

Habitat. Semi-desert or desert uplands, inhabiting bare, stony plateaux, rocky hillsides, gravelly or sandy river valleys and lacustrine depressions, often at the edge of snowfields; reported at altitudes of c. 3600-4900 m in Pamirs,

4200-5700 m in Tibet and 5700-6000 m in Karakoram; during winter occurs lower down, in snow-free areas.

Food and Feeding. Seeds, buds and green parts of plants, especially legumes. Apparently, as an exception among sandgrouse, present species flies to drink only irregularly.

Breeding. May-Jun (S Tibet). Nest is scrape among small stones or earth, with no lining. Usually 3 eggs, occasionally 2; incubation 20-24 days; downy chick is peculiar yellowish colour.

Movements. Sedentary; performs altitudinal movements to lower levels in winter, in order to escape from snowed up areas.

Status and Conservation. Not globally threatened. Reported as being relatively common and fairly widespread in Tibet, though information rather sparse. Has undergone marked decline in former USSR in recent years, with no more than 300 birds probably remaining now in the Pamirs; species included in Russian Red Data Book.

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2. Pallas's Sandgrouse

Syrrhaptes paradoxus

French: Syrrhapte paradoxal

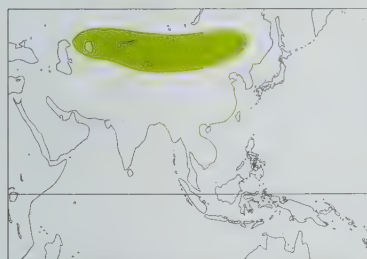
German: Steppenflughuhn

Spanish: Ganga de Pallas

Taxonomy. *Tetrao paradoxus* Pallas, 1773, southern Tartarian Desert.

Monotypic.

Distribution. Mostly between 40° N and 50° N, from Kazakhstan and Uzbekistan through NW China (Xinjiang) and Mongolia E to NC China (Gansu), S to Kunlun Shan and Qaidam Basin in Qinghai (WC China); sporadically E to Inner Mongolia and Heilongjiang (NE China).



Descriptive notes. 40 cm; male c. 250-300 g, female c. 200-260 g; wingspan 60-71 cm. Front toes feathered, hind toe lacking; long, pin-like central tail feathers; outermost primary longer and attenuated, particularly so in males. Black ventral patch, contrasting markedly with pale rest of underparts; upperparts barred; bluish grey orbital ring. Male has diffuse pectoral band; female has narrow black line under throat. Juvenile fairly similar to female, without elongated rectrices or remiges; has brown spots on neck and breast.

Habitat. Steppe and semi-desert, with low, sparse vegetation of grasses or shrubs (*Artemisia absinthium*, *Agriophyllum gobicum*); also fallow land and abandoned fields; said to prefer clay to sandy or stony soils; avoids drifting sands and waterless expanses. Occurs on flat or hilly terrain, also in mountain valleys up to 1850 m in Gobi Altai, to 2400 m in NW Mongolia, and to 3250 m in Tien Shan.

Food and Feeding. Takes seeds and also some green shoots of many different plants including Leguminosae, Polygonaceae, Chenopodiaceae, Cruciferae and Gramineae. In some areas, at least, also feeds on cultivated grain (*Triticum*, *Panicum*). Drinks during morning, 06:00-10:00 hours, but sometimes also in the evening.

Breeding. Laying from mid-Apr to Jun. Nests on ground, sometimes sheltered by bush or grasses; often close to other pairs, with nests only 4-6 m apart. Usually 3 eggs, sometimes 2; incubation c. 23-26 days; chick has tawny buff down with blackish mottling and narrow white lines.

Movements. Partially migratory; northern areas abandoned for winter, from Sept/Oct to Mar/Apr; extent of movements depend on amount of snowfall. Irregular irruptions have taken place both in W Europe, notably in 1863, 1888 and 1908, and in N China (1860) and Manchuria (1912/13, 1922/23); causes of such irruptions unclear, but probably related to food supply, in connection with snow cover, prolonged drought, or failing seed crops, rather than with intrinsic demographic cycles. Species bred in several European countries after 1888/89 irruption. See page 46.

Status and Conservation. Not globally threatened. Extensive range and remote, sparsely populated habitat probably make present species relatively safe. Somewhat sporadic in occurrence in former USSR, but nesting territories there said to be densely occupied. Irregular in numbers over vast Chinese range, but very common in certain years.

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Genus *PTEROCLES* Temminck, 1815

3. Pin-tailed Sandgrouse

Pterocles alchata

French: Ganga cata

German: Spießflughuhn

Spanish: Ganga Ibérica

Other common names: White-bellied/Large Pin-tailed Sandgrouse

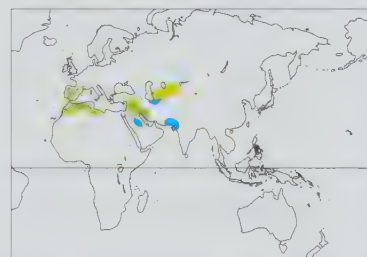
Taxonomy. *Tetrao Alchata* Linnaeus, 1766, Spain.

Two subspecies recognized.

Subspecies and Distribution.

P. a. alchata (Linnaeus, 1766) - Iberian Peninsula and SE France.

P. a. caudacutus (S. G. Gmelin, 1774) - NW Africa, from Morocco E to N Libya; SE Turkey and Middle East through Iraq and Iran E to Uzbekistan and S Kazakhstan.



Descriptive notes. 31-39 cm; male c. 250-400 g, female c. 210-370 g; wingspan, 54-65 cm. Long central rectrices; underwing and belly white; broad chestnut band on breast, bordered with black lines; bill bluish grey-horn; orbital ring blue. Female duller, and has additional black line on neck. Exceptionally among sandgrouse, a non-breeding plumage exists in male, showing: white throat; black eyestripe reduced or absent; and dorsal parts barred, without yellow spots. Juvenile paler and more uniformly coloured; brown breast without upper black line, lower line scarcely apparent. Race *caudacutus* paler, with longer wings.

Habitat. Semi-arid and arid treeless plains, from semi-desert and steppe to dry mudflats near marshes and dry cereal cultivations; apparently prefers clay or sandy to rocky or stony substrates; avoids dense scrub or tall crops, as well as hilly areas and high altitudes in general.

Food and Feeding. Mainly feeds on seeds, but to lesser extent also green shoots and leaves. Strongly selects Leguminosae, and also takes *Polygonum*, *Fagopyrum*, *Salicornia*, *Artemisia*, *Alhagi*, *Helianthemum*, *Asphodelus* and others; in agricultural areas, takes cereal grain and cultivated legumes as well. In C Spain: in stomachs of 21 birds collected during winter, seeds amounted to 97% of weight of ingested food, with 19 plant species taken, including 12 Leguminosae; for 48 birds taken during summer, cultivated plants (*Avena*, *Triticum*, *Hordeum*, *Secale*, *Lens*) made up over 75%. Species typically drinks during morning; in Spain, on average c. 2 hours 45 minutes after sunrise, and in hot weather some birds also c. 1 hour 20 minutes before sunset.

Breeding. Lays Apr-Aug, mostly May-Jun; in Spain, clutches in Jul-Aug probably due to replacement. Nest is slight scrape or natural depression in ground; frequently in hoof-prints in Iraq; nest unlined; nests sometimes appear quite close to one another. Lays 3 eggs; incubation c. 20-22 days; male incubates from c. 50 minutes before sunset to c. 3½-4 hours after sunrise; chick has ochraceous brown down mottled black; young half-grown and able to fly at c. 25 days, but depend on parents until at least 2 months old. No evidence of second broods. In a study in Spain (27 clutches and 29 broods followed) 92% eggs hatched, 19% produced fledged young, with overall average of 0.55 fledged young per breeding pair; in Iraq most eggs predated. In captivity, one female was recorded as living for more than 10 years.

Movements. Sedentary and nomadic in Europe, N Africa and Middle East; mostly migratory in Turkistan and other more northerly parts of range, where absent from Oct/Nov to Mar/Apr; large numbers winter in Pakistan (Baluchistan, Sind) and NW India.

Status and Conservation. Not globally threatened. Common or locally numerous in Morocco, Algeria, Iraq, N Iran and Turkistan, where concentrations of up to 10,000's have been reported. Endangered in Europe, where still common in parts of Spain, e.g. Ebro Valley and Southern Meseta, but sharply declining due to agricultural changes; 150-200 pairs at La Crau, the only current site for present species in France; densities of c. 2-4 birds/km² have been reported for good areas at La Crau, c. 2-6 at La Serena, SW Spain. Scarce in Tunisia and Libya; scarce resident in Arabia, but locally common during winter in Northern Desert; scarce and rather local winter visitor in Pakistan.

Bibliography. Ali & Ripley (1981), Blanco & González (1992), de Borbón (1994b, 1995), Brosset (1961), Casado (1981), Casado *et al.* (1983), Charco (1995), Cheylan (1990), Cheylan *et al.* (1983), Cramp (1985), Dementiev & Gladkov (1951b), Díaz *et al.* (1996), Estrada & Curcó (1991), Échécopar & Hùe (1964), Evans, M.I. (1994), Ferguson-Lees (1969), Ferns & Hinsley (1994), Fjeldsá (1977), Flint *et al.* (1984), Frisch (1969b, 1970), Germain (1965), Gélroudet (1983), Glutz von Blotzheim *et al.* (1977), de Guadalfajara (1985), de Guadalfajara & Tutor (1987), Guichard (1961), Heim de Balsac & Maynaud (1962), Hinsley (1990, 1994), Hinsley & Ferns (1994), Hinsley *et al.* (1993), Hùe & Échécopar (1970), Jennings (1995), de Juana, Martín *et al.* (1993), de Juana, Santos *et al.* (1988), Knystautas (1993), Kovshar *et al.* (1986), Kumerloeve (1968), Ledant *et al.* (1981), Makatsch (1974), Marchant (1961b, 1962), Meade-Waldo (1896, 1897, 1906, 1922), Meinertzhagen (1954), Motis (1983), Mukherjee (1995), Parra & Levassor (1982), Paz (1987), Porter *et al.* (1996), Ripley (1982), Roberts, T.J. (1991), Rufino (1989), Rutgers & Norris (1970), Shirihai (1996), Simeonov *et al.* (1990), Stepanyan (1990a), Stresemann & Stresemann (1966), Thomas & Robin (1977), Urban *et al.* (1986), Valverde (1961), Vaughan (1996), Vaurie (1965).

4. Namaqua Sandgrouse

Pterocles namaqua

French: Ganga namaqua

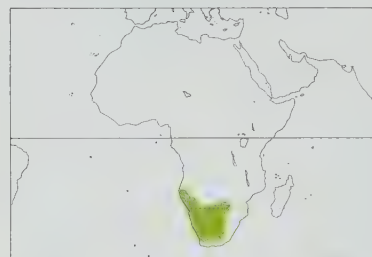
German: Namaflughuhn

Spanish: Ganga Namaqua

Taxonomy. *Tetrao Namaqua* J. F. Gmelin, 1789, Hantams Berg, north of Calvinia, western Cape Province.

May be closely related to *P. exustus*. Birds from N part of range formerly separated as race *ngami*, those of S & SE as *furva*. Monotypic.

Distribution. SW Angola and Namibia E to SW Zimbabwe, and S through Botswana, W Transvaal and Orange Free State to S Cape Province.



Descriptive notes. c. 28 cm; male c. 170-190 g, female c. 150-190 g. Small sandgrouse; like *P. senegallus*, combines long tail and dark underparts with pale underwing. Male has white and chestnut pectoral band, and brown belly that fades towards the rear; head without distinctive marks; bill greyish; orbital ring yellow. Female extensively mottled above; has uniformly barred underparts. Juvenile similar to adult, but more cryptically coloured; male with barred head and back.

Habitat. Sub-desert and fringes of desert, in a variety of habitats; commoner in flat or rolling country with short, thin grass and scattered

shrubs and succulent plants; also found in more heavily wooded dry savannas.

Food and Feeding. Eats small, dry seeds, showing a strong preference for certain plants, notably *Tephrosia dregeana* (Leguminosae) and *Cleome* (Capparidaceae) in the Namib, or *Lophiocarpus burchelli* (Chenopodiaceae) in the Kalahari; fragments of insects and molluscs perhaps ingested by chance or as grit. Species drinks in the morning, c. 08:00-10:00 hours, some birds also in late afternoon.

Breeding. Period is extended, probably dependent on rainfall: in S Africa in general, all months except Mar and May, with peaks during cooler months Aug-Nov; in Kalahari, after rains, mainly Jul-Nov; in S Cape Province, as an exception, during spring and summer, probably to avoid winter rains. Nest is simple scrape in bare soil or among stones, grass tufts or scrub; often breeds in small, loose colonies, with nests as close together as 22 m. Usually 3 eggs, average 2.9; incubation c. 21 days; male incubates at night, from 14 hours per day if in summer to 18 hours if in winter, but female rarely sits for more than 10 hours; chick has yellowish brown down marbled creamy whitish; young half-grown and fully feathered at 3 weeks, capable fliers at c. 6 weeks. Of 69 eggs in 21 clutches, 68% hatched; average of perhaps 1.3 young fledged per breeding pair.

Movements. Sedentary and locally nomadic; southern populations migratory, those breeding in Karoo moving N to N Cape, Botswana and Namibia.

Status and Conservation. Not globally threatened. Common to locally abundant in much of range. Usually occurs in pairs or small parties, but sometimes in fairly large flocks. Now absent from former range in Orange Free State and Lesotho; less common in recent times in Transvaal, where occurrence of species is nowhere predictable or regular.

Bibliography. Bergman & Bergman (1994), Cade (1965), Cade & Maclean (1967), Cade *et al.* (1966), Clancey (1967a, 1967b, 1979), Dixon (1976, 1977, 1978), Dixon & Louw (1978), Dowsett & Forbes-Watson (1993), Ginn (1977), Ginn *et al.* (1989), Helme (1991), Hockey *et al.* (1989), Joubert & Maclean (1974), Knight (1989), Little, Crowe & Villacastin-Herrero (1996), Little, Malan & Crowe (1993), Lloyd (1996/97), Mackworth-Praed & Grant (1962), Maclean (1968, 1976, 1993), MacLeod (1966), Malan *et al.* (1993, 1994), McLachlan (1985), Penry (1994), Pinto (1983), Snow (1978), Tarboton *et al.* (1987), Thomas & Maclean (1981), Thomas *et al.* (1981), Urban *et al.* (1986), Vincent (1944).

5. Chestnut-bellied Sandgrouse

Pterocles exustus

French: Ganga à ventre brun

German: Braunbauchflughuhn

Spanish: Ganga Moruna

Other common names: Indian/Common Indian/Small Pin-tailed/Lesser Pin-tailed Sandgrouse

Taxonomy. *Pterocles exustus* Temminck, 1825, Senegal.

Six subspecies recognized.

Subspecies and Distribution.

P. e. exustus Temminck, 1825 - Mauritania and Senegambia E to Sudan.

P. e. floweri Nicoll, 1921 - Nile Valley in C Egypt (almost certainly extinct).

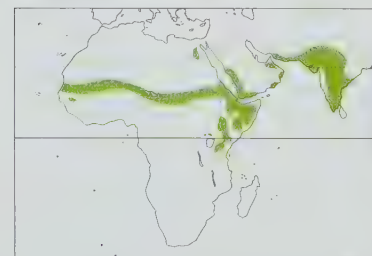
P. e. ellioti Bogdanow, 1881 - SE Sudan E to Eritrea, N Ethiopia and Somalia.

P. e. olivascens (Hartert, 1909) - S Ethiopia, Kenya and N Tanzania.

P. e. erlangeri (Neumann, 1909) - W & S Arabian Peninsula.

P. e. hindustan R. Meinertzhagen, 1923 - SE Iran, Pakistan and most of India.

Introduced (*hindustan*) to Hawaii.



Descriptive notes. 31-33 cm; male c. 170-290 g, female c. 140-240 g; wingspan 48-51 cm. Relatively small species, with elongated central tail feathers, dark underwing and blackish belly; unmarked head. Male has narrow pectoral band and chestnut brown belly darkening towards rear; bill slate blue with darker tip; orbital ring pale greenish. Female more mottled above; shows "tricoloured" ventral pattern. Juvenile has short tail; upperparts more densely barred and underparts less contrasting. Races differ mainly in tone of upperpart coloration.

Habitat. Typically inhabits bare semi-desert, often with scattered thorny scrubs or trees, e.g.

Acacia, *Ziziphus* and *Capparis* in Pakistan and NW India; also found in marginal cultivation, fallow fields, wasteland and grassland. Occurs in flat or rolling terrain, up to 1500 m in altitude.

Food and Feeding. Mainly seeds, which are often hard and very small; shows a possible preference for legumes, in Pakistan and NW India taking *Indigofera* and *Tephrosia*, in Sudan *Tephrosia*, and in Tanzania *Indigofera* and *Trianthema*; also feeds on cultivated grains in stubble; will take shoots and perhaps insects on occasions. Feeds during cooler hours of morning and afternoon; drinks 2-3 hours after sunrise, while in very hot weather some individuals drink again before sunset.

Breeding. Period extended, with variability related to local rainfall: Jan-Apr in S India; Mar-May in N India; Apr-Jun in Arabia, Sudan, Ethiopia and Somalia; Feb-Nov in Kenya; May-Nov in N Tanzania;

and mainly Mar-Jul in Mali and Senegambia. Nest is simple scrape in ground, lined scantily or not at all. Usually 3 eggs; incubation 22-23 days, with male sitting by night; chick has golden buff down with black and white markings.

Movements. Sedentary and nomadic; rainfall-related movements detected in Mali, Niger, Nigeria, Pakistan and India. Accidental in Hungary: female shot in flock of *Syrhaptes paradoxus* Aug 1863. Two birds released in Nevada, USA, recovered in Sonora, Mexico.

Status and Conservation. Not globally threatened. Common and widespread through most of extensive range; very common to abundant in some areas, e.g. in N Senegambia, NC Mali, C Chad, N Sudan, lowlands of Ethiopia, Somalia and Pakistan. Often flocks of thousands gather at watering points, with up to 50,000 birds recorded at Kabara L in Mali. Race *floweri* of Nile Valley in Egypt probably now extinct; formerly fairly common, but had already become scarce by 1929, with last sighting of 10 birds between Isna and Idfu, in Mar 1979.

Bibliography. Aldrich (1943), Ali (1996), Ali & Ripley (1981), Archer & Godman (1937-1961), Ash & Miskell (1983), Aspinall (1996a), Baker (1935), Bates (1939), Böhm (1985), Britton (1980a), Bundy (1990), Bundy & Warr (1980), Cave & Macdonald (1955), Cheke & Walsh (1996), Christensen (1963b), Christensen & Bohl (1964), Christensen *et al.* (1964), Cornwallis & Porter (1982), Cramp (1985), Dowsett & Forbes-Watson (1993), Elgood, Fry & Dowsett (1973), Elgood, Heigham *et al.* (1994), Étiéopcar & Hüe (1964), Evans, M.I. (1994), Faruqi *et al.* (1960), Friedmann (1930a), Gallagher & Woodcock (1980), Giraudeau *et al.* (1988), Glutz von Blotzheim *et al.* (1977), Goodman *et al.* (1989), Hüe & Étiéopcar (1970), Jennings (1995), Kalchreuter (1979, 1980), Lamarche (1980), Lever (1987), Lewis & Pomeroy (1989), Mackworth-Praed & Grant (1957, 1970), Meade-Waldo (1922), Meinertzhagen (1954), Morel & Morel (1970), Mukherjee (1995), Newby (1979), Nikolaus (1987), Njoroge (1995), Paton *et al.* (1982), Porter *et al.* (1996), Rahmani & D'Silva (1986), Richardson (1990), Ripley (1982), Roberts, T.J. (1991), Sharma (1984), Short *et al.* (1990), Smith (1957), Snow (1978), St. Quentin (1905), Urban *et al.* (1986), Vaurie (1961, 1965), Walker (1981a, 1981b), Zimmerman *et al.* (1996).

6. Spotted Sandgrouse

Pterocles senegallus

French: Ganga tacheté

German: Tropfenflughuhn

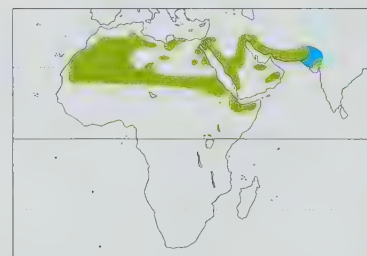
Spanish: Ganga Moteada

Other common names: Northern Spotted/Saharan Sandgrouse

Taxonomy. *Tetrao senegallus* Linnaeus, 1771, Senegal; error = Algeria.

Birds of India formerly separated as race *remotus*. Monotypic.

Distribution. S Morocco, Western Sahara and Mauritania through Sahara Desert to Ethiopia and N Somalia, and on through Arabian Peninsula and Iraq to Pakistan and NW India, where occurs in Indian and Thar Deserts.



Descriptive notes. 30-35 cm; c. 250-340 g; wingspan 53-65 cm. Only sandgrouse with elongated central rectrices lacking colour separation on breast; diagnostic longitudinal black stripe on belly, more conspicuous during flight; dark trailing edge of wing; throat and sides of head ochre or orange-yellow, paler in female; orbital ring yellow; bill bluish. Dark spots on breast and upperparts of female, but difficult to appreciate from a distance. Juvenile has short tail feathers, white throat and barred and streaked upperparts. Birds from Pakistan and India usually slightly paler, more greyish.

Habitat. Sparsely vegetated semi-desert and

desert, with patches of vegetation; drinking water is required nearby; usually avoids thick scrub, trees and arable land, occupying both stony and sandy areas.

Food and Feeding. Consumes primarily small, hard seeds; apparently shows distinct preference for certain plants, e.g. *Euphorbia guyoniana* and *Asphodelus tenuifolius* in Morocco, and grain such as barley (*Hordeum*) in Iraq. Feeds mostly during morning or late afternoon; drinks during morning, 06:30-08:00 hours.

Breeding. Laying Mar-Jul. Nest is scrape or natural depression on ground; typically hoof-marks in Iraq, or near a stone in E Morocco. Usually 3 eggs; incubation 29-31 days, with male sitting by night; downy chick pale greyish brown, only faintly marked. Seldom more than 2 young reared.

Movements. Perhaps mostly sedentary and nomadic; wintering reported for areas of Morocco and Algeria (Oct-Mar) and also in Pakistan and NW India.

Status and Conservation. Not globally threatened. Widespread and frequent to common throughout most of extensive range. Patchily distributed in Morocco; uncommon in Arabian Peninsula. Common resident from Israel S through Negev into Sinai. Recently discovered to be resident in area of Desert National Park, Rajasthan, whereas previously thought to be only winter visitor to India.

Bibliography. Ali & Ripley (1981), Ash & Miskell (1983), Atta (1987), Bundy & Warr (1980), Cave & Macdonald (1955), Cramp (1985), Dowsett & Forbes-Watson (1993), Dupuy (1969), Étiéopcar & Hüe (1964), Evans, M.I. (1994), George (1969, 1970), Giraudeau *et al.* (1988), Goodman *et al.* (1989), Heim de Balsac & Mayaud (1962), Hinsley & Ferns (1994), Hüe & Étiéopcar (1970), Jennings (1981a, 1995), Kainady (1977), Lamarche (1980), Ledant *et al.* (1981), Mackworth-Praed & Grant (1957, 1970), Marchant (1961b, 1963), Marder *et al.* (1986), Meinertzhagen (1954), Mukherjee (1995), Nikolaus (1987), Paz (1987), Porter *et al.* (1996), Prendergast (1993), Ripley (1982), Roberts, T.J. (1991), Sangha (1993), Shirihai (1996), Smith (1957), Thomas & Robin (1977), Thomsen & Jacobsen (1979), Urban *et al.* (1986), Valverde (1957), Vaurie (1965).

7. Black-bellied Sandgrouse

Pterocles orientalis

French: Ganga unibande

German: Sandflughuhn

Spanish: Ganga Ortega

Other common names: Imperial/Oriental/Large Sandgrouse

Taxonomy. *Tetrao orientalis* Linnaeus, 1758, Anatolia, Turkey.

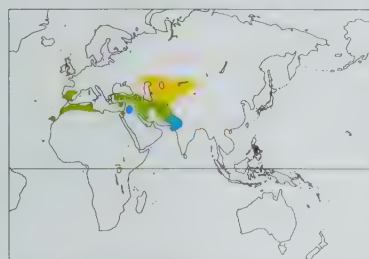
In past, occasionally included in genus *Eremialector*. Birds of Iberia and NW Africa formerly separated as race *aragonica*. Possible races *enigmaticus*, *kostovae* and *bangsi* now included in nominate. Two subspecies currently recognized.

Subspecies and Distribution.

P. o. orientalis (Linnaeus, 1758) - Iberian Peninsula, Canary Is (Fuerteventura, Lanzarote) and NW Africa from Morocco to NW Libya; also Cyprus, Israel, Anatolia and Armenia.

P. o. arenarius (Pallas, 1775) - NW Kazakhstan E to NW China (NW Xinjiang), and S to Iran, Afghanistan and SW Pakistan (Baluchistan).

Descriptive notes. 33-39 cm; male c. 400-550 g, female c. 300-460 g; wingspan 70-73 cm. Bulky sandgrouse; combines black belly with wedge-shaped, short central rectrices; underside of wings has



white coverts contrasting with dark remiges; narrow pectoral black band and black patch at base of throat, bigger and triangular-shaped in male; bill grey to black-horn, orbital ring whitish. Female duller and more mottled. Juvenile like adult, but paler. Race *arenarius* somewhat paler, but some specimens indistinguishable.

Habitat. Semi-arid plains, with steppe to semi-desert vegetation, including pastoral scrubland and dry cereal cultivation with associated fallow ground. As a rule, occurs in cooler and less arid situations than sympatric *Pterocles* species; compared with *P. alchatta*, tolerates occasional shrubs or trees and also occupies foothills and

upland plateaux. Wintering habitats in Pakistan and India are semi-deserts in sandy plains, sometimes salt-encrusted wasteland and fallow land around irrigated desert cultivation.

Food and Feeding. Consumes seeds, often small or very small, apparently preferring Leguminosae (*Melilotus*, *Astragalus*, *Onobrychis*, *Indigofera*, *Tephrosia*), but also *Heliotropium*, *Polygonum*, *Sisymbrium*, *Salicornia*, *Ammodendron* and others; in agricultural areas, feeds on cereal grain (*Triticum*, *Hordeum*, *Panicum*) and cultivated legumes (*Phaseolus*). Drinks during morning, typically c. 3 hours after sunrise; in hot weather, some birds drink again c. 1 hour before sunset.

Breeding. Laying Mar-Aug, varying with latitude: mostly Apr in Canary Is; mostly Jun in Spain and former USSR, with replacement clutches until Sept. Nest is scrape or natural depression, usually unlined. Commonly 3 eggs, average 2.6 in N Africa; 2.5 in Spain and 3.0 in Turkey; incubation 21-24 days (23-28 reported in captivity), with male sitting from c. 1 hour before sunset to c. 4 h after sunrise; chick has tawny ochre down with black and white markings; young fly at c. 1 month, when 3/4 of adult size, fully grown at c. 2 months. No evidence of second broods. In a study in Spain (12 clutches and 19

broods) 86% of eggs hatched, 42% produced fledged young, with average of 1.05 fledged young per breeding pair.

Movements. Sedentary in Iberia and N Africa; nomadic or partly migratory in Turkey and Middle East; largely migratory in Kazakhstan, Turkestan and rest of northern breeding areas. Winter grounds scattered through Near and Middle East, S to Sinai and Kuwait, E to NW India; high numbers in Pakistan and India from Sept/Oct to Feb/Mar.

Status and Conservation. Not globally threatened. Widespread but often uncommon and usually encountered in pairs or small flocks, except in some winter quarters. Uncommon in Spain, where considered threatened; almost extinct in Catalonia; c. 1-3 birds/km² reported for La Serena, Extremadura. Total of 100-1000 birds in E Portugal, where decreasing. Uncommon to frequent in Algeria; scarce but evenly distributed in Tunisia; in Libya, frequent in N Tripolitania, a few winter in Cyrenaica; occasional winter visitor to Egypt. Fairly common in Negev (Israel). Rather common in E Turkey. Fairly sporadically distributed in former USSR, but common in appropriate habitat in some areas, e.g. deserts of Kyzyl-Kum and Kara-Kum, and near Samarkand, Uzbekistan, where 1-33 birds/km² reported for different habitats. Rare in NW China (Xinjiang). Still common at winter quarters in Pakistan (Punjab) and NW India, where formerly occurred in enormous concentrations at certain sites, e.g. L Gajner.

Bibliography. Ali (1996), Ali & Ripley (1981), Baker (1935), Bannerman (1963), Bannerman & Bannerman (1958), Blanco & González (1992), de Borbón (1994a, 1995), Brosset (1961), Brosset & Petter (1966), Bump & Bohl (1964), Cheng Tsohsin (1987), Christensen (1963a), Cramp (1985), Dementiev & Gladkov (1951b), Díaz *et al.* (1996), Estrada & Curc6 (1991), Échécopar & Hùe (1964, 1978), Evans, M.I. (1994), Fjeldså (1977), Flint *et al.* (1984), Gavrin *et al.* (1962), Glutz von Blotzheim *et al.* (1977), Goodman *et al.* (1989), Green & Moorhouse (1995), Heim de Balsac & Mayaud (1962), Herranz & Bielsa (1988), Hinsley (1990, 1994), Hinsley & Ferns (1994), Hinsley *et al.* (1993), Hùe & Échécopar (1970), Johansen (1959), de Juana, Martín *et al.* (1993), de Juana, Santos *et al.* (1988), Knystautas (1993), Kovshar *et al.* (1986), Ledant *et al.* (1981), Makatsch (1974), Marco & García (1983), Meade-Waldo (1922), Meinertzhagen (1954), Mukherjee (1995), Paz (1987), Porter *et al.* (1996), Ripley (1982), Roberts, T.J. (1991), Rufino (1989), Rutgers & Norris (1970), Shirihai (1996), Simeonov *et al.* (1990), Stepanyan (1990a), Thomas & Robin (1977), Urban *et al.* (1986), Vaughan (1996), Vaurie (1961, 1965).



8. Yellow-throated Sandgrouse

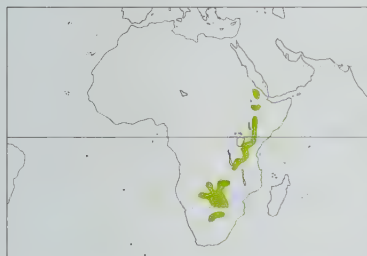
Pterocles gutturalis

French: Ganga à gorge jaune **German:** Gelbkehl-Flughuhn **Spanish:** Ganga Gorgigualda

Taxonomy. *Pterocles gutturalis* A. Smith, 1836, near Kurrichane, western Transvaal, South Africa. In past, sometimes included in genus *Eremialector*. Birds from E of L Tanganyika formerly separated as race *tanganjicae*. Two subspecies recognized.

Subspecies and Distribution.

P. g. saturator Hartert, 1900 - Ethiopia S through Kenya and Tanzania to extreme N Zambia.
P. g. gutturalis A. Smith, 1836 - S Zambia and W Zimbabwe S through Botswana to N Cape Province and W Transvaal.



Descriptive notes. 30 cm; male c. 340-345 g, female c. 285-400 g. Short, wedge-shaped tail; no breastband but conspicuous head pattern in male: supercilium, sides of face, chin and throat buffish yellow, loreal stripe and half-collar black; dark underparts, including chestnut belly and blackish underwing; orbital ring grey, bill bluish grey. Female has loreal stripe brown, and yellowish throat is not bordered with black; underparts barred. Juvenile similar to adult female, with smaller spots and narrower bars on upperparts. Race *saturator* has brighter, more cinnamon margins to upperwing-coverts.

Habitat. Open plains with short grass, often near rivers or swamps; favours recently burnt areas; also found in ploughed land and on fallow ground. In Kenya, avoids arid country and occupies highlands at altitudes of 800-2000 m.

Food and Feeding. Chiefly consumes seeds, including those of Leguminosae (*Cassia*, *Crotolaria*, *Sesbania*), Gramineae (*Leersia*, *Rottboellia*) and others (*Achyramithes*, *Bidens*); also eats cultivated grain. Drinks during morning, around 07:00-10:00 hours.

Breeding. Mainly nests in dry season, Apr-Sept, but precise timing varies through extensive range. Nest is a scrape or a natural hollow in ground, sometimes in a hoof-print; often partly hidden by tuft of grass or stubble. Usually 3 eggs, sometimes 2; incubation c. 25 days; downy chick boldly patterned rufous brown, black and whitish; young able to fly when about half adult size.

Movements. Race *saturator* largely sedentary; race *gutturalis* partially migratory, breeding in S Zambia and N Botswana, and wintering in Zimbabwe, SE Botswana, Transvaal and N Cape Province.

Status and Conservation. Not globally threatened. Frequent to locally common throughout most of sizeable range. Usually recorded in small parties, but sometimes in large flocks. Said to have declined in Transvaal, where may not be present every year. In South African Red Data Book, listed as indeterminate. Has been bred in captivity.

Bibliography. Aspinwall (1990), Benson & Pitman (1964), Benson *et al.* (1971), Britton (1980a), Brooke (1968, 1984a), Clancey (1967a), Dowsett & Forbes-Watson (1993), Friedmann (1930a), Ginn *et al.* (1989), Grueber (1987), Jackson (1926), Lewis & Pomeroy (1989), Mackworth-Praed & Grant (1957, 1962), Maclean (1993), Mungure (1974), Newman (1996), Penry (1994), Pinto (1983), Short *et al.* (1990), Sinclair & Davidson (1995), Smith (1957), Snow (1978), Tarboton *et al.* (1987), Urban *et al.* (1986), Zimmerman *et al.* (1996).

9. Crowned Sandgrouse

Pterocles coronatus

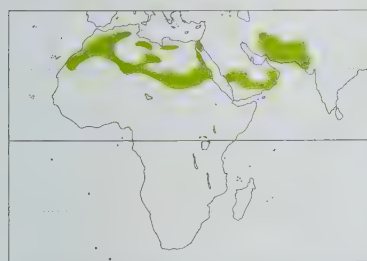
French: Ganga couronné **German:** Kronenflughuhn **Spanish:** Ganga Coronada
Other common names: Coronetted/Yellow-throated Sandgrouse

Taxonomy. *Pterocles coronatus* Lichtenstein, 1823, Nubia.

In past, sometimes included in genus *Eremialector*. Five subspecies recognized.

Subspecies and Distribution.

P. c. coronatus Lichtenstein, 1823 - Sahara Desert, from S Morocco and Western Sahara E to N Sudan and Red Sea.
P. c. vastitas R. Meinertzhagen, 1928 - Sinai and neighbouring areas in Israel and Jordan.
P. c. saturatus Kinnear, 1927 - hilly country of interior Oman.
P. c. atratus Hartert, 1902 - S Arabia through Iran to S Afghanistan.
P. c. ladas Koelz, 1954 - Pakistan.



Descriptive notes. 27-30 cm; 240-300 g; wing-span 52-63 cm. Short, but pointed central rectrices; lacks bands or patches on undersides; in flight, dark remiges contrast with paler wing lining. Male has striking head pattern, with rufous or vinaceous crown patch and black mask; orbital ring and bill bluish. Female has face and throat pale yellow; plumage densely barred or spotted. Juvenile similar to adult female, with coarser barring and whitish throat. Races show different tones of background colour and variable degree of barring in female.

Habitat. Desert and semi-desert, including the very hottest and driest areas; prefers stony to

sandy substrates, typically inhabiting *hamnada* desert. Also occurs in mountainous areas, e.g. Air, Hoggar and Tibesti.

Food and Feeding. Feeds mainly on seeds, often small and hard ones; also takes shoots. In Sudan, favours *Tephrosia apollinea* (Leguminosae); in S Morocco feeds on *Asphodelus tenuifolius* (Liliaceae). Drinks in morning c. 09:00-10:00 in winter, 07:00-09:00 in summer; sometimes also drinks in evening.

Breeding. Season Apr-Jun. Nest is scrape among pebbles or depression in sand, sometimes with ring of small stones around it. Usually 3 eggs, sometimes 2; incubation period unknown, but male known to incubate at night, taking over c. 1 hour before sunset; downy chick markedly uniform rufous buff, with darker facial patch.

Movements. Sedentary and nomadic. In NE Morocco only occurs Oct-Mar; in Chad moves N Apr-Jun. In Pakistan numbers increase in winter.

Status and Conservation. Not globally threatened. Widespread and fairly common as a rule; frequent in Algeria, where is commonest sandgrouse in Ksour Mts and, at any rate formerly (1930's), locally abundant in Hoggar; common in Fezzan and (in 1950's) very common in Tibesti; fairly common in Sudan and Egypt. Quite common in Negev Desert, Israel; widespread but rare in Saudi Arabia; common in Dhofar, Oman; few records in Arabian Gulf States; frequent to common but comparatively local in Pakistan.

Bibliography. Ali & Ripley (1981), Baker (1935), Bundy & Warr (1980), Cave & Macdonald (1955), Cramp (1985), Dowsett & Forbes-Watson (1993), Dupuy (1969), Étchécopar & Hùe (1964), Evans, M.I. (1994), George (1970), Giraudoux *et al.* (1988), Goodman *et al.* (1989), Heim de Balsac & Mayaud (1962), Hùe & Étchécopar (1970), Jennings (1981a, 1995), Ledant *et al.* (1981), Mackworth-Praed & Grant (1957, 1970), Meinertzhagen (1954), Newby (1979), Nikolaus (1987), Paz (1987), Porter *et al.* (1996), Ripley (1982), Roberts, T.J. (1991), Robin (1966), Shirihai (1996), Thomas & Robin (1977), Urban *et al.* (1986), Valverde (1957), Vaurie (1961, 1965), Walker (1981a, 1981b).

10. Black-faced Sandgrouse

Pterocles decoratus

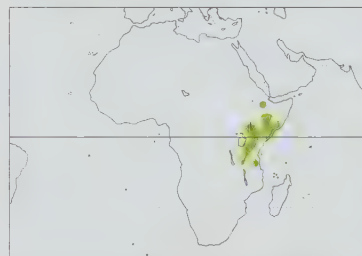
French: Ganga à face noire **German:** Schmuckflughuhn **Spanish:** Ganga Decorada
Other common names: Bridled/Masked Sandgrouse

Taxonomy. *Pterocles decoratus* Cabanis, 1868, Lake Jipe, Kenya-Tanzania border.

In past, sometimes included in genus *Eremialector*. Birds of N Tanzania formerly awarded separate race, *kathariniae*. Three subspecies recognized.

Subspecies and Distribution.

P. d. ellenbecki Erlanger, 1905 - NE Uganda and N Kenya E to S Ethiopia and S Somalia; also occurs in E Ethiopia.
P. d. decoratus Cabanis, 1868 - SE Kenya and E Tanzania.
P. d. loveridgei (Friedmann, 1928) - W Kenya and W Tanzania.



Descriptive notes. 28 cm; c. 140-210 g. Somewhat similar to *P. coronatus* and *P. personatus*, with short tail and black facial mask in male, but present species shows contrasting underparts, with blackish belly and broad white transversal band; in male, upper breast plain brown bordered by narrow black band; barred in female; extensive mask fringed white, which continues in long black and white supercilium; orbital ring yellow; bill rich yellow in male, greyish in female. Juvenile similar to adult female, with darker dorsal barring. Races separated on tone of overall coloration.

Habitat. Dry savanna and bushveld to semi-desert scrub; sometimes occurs within dense thornbush in small open spaces, e.g. road verges. Recorded up to altitude of 1600 m in Kenya.

Food and Feeding. In Tanzania, takes seeds, mostly Leguminosae (*Indigofera*, *Trianthema*) and Boraginaceae (*Heliotropium*). Drinks during first half of morning.

Breeding. In Tanzania nests from May to Nov/Dec, probably peaking in Jun-Aug, during dry season. Nest is unlined scrape on sandy or stony ground. Usually 3 eggs, sometimes 2; incubation and fledging periods unknown; downy chick sandy or golden, mixed with grey and mottled black. Juvenile breeding and double-brooding have been suggested, but no hard evidence to date.

Movements. Poorly known; may be chiefly sedentary.

Status and Conservation. Not globally threatened. Usually encountered in pairs or small parties. Frequent in Ethiopia; common and widespread in S Somalia; locally common in Kenya.

Bibliography. Ash & Miskell (1983), Britton (1980a), Dowsett & Forbes-Watson (1993), Jackson (1926), Kalchreuter (1979, 1980), Lewis (1990), Lewis & Pomeroy (1989), Mackworth-Praed & Grant (1957), Meinertzhagen (1960), Njoroge (1995), Schels & Lavoyer (1987), Snow (1978), Short *et al.* (1990), Urban & Brown (1971), Urban *et al.* (1986), Zimmerman *et al.* (1996).

11. Madagascar Sandgrouse

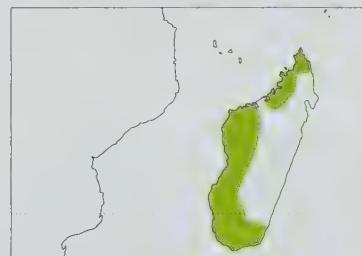
Pterocles personatus

French: Ganga masqué **German:** Madagaskarflughuhn **Spanish:** Ganga Malgache
Other common names: Malagasy/Masked Sandgrouse

Taxonomy. *Pterocles personatus* Gould, 1843, Majambo Bay, Madagascar.

Monotypic.

Distribution. N, W & S Madagascar.



Descriptive notes. c. 35 cm. Somewhat similar to *P. coronatus* and *P. decoratus*, with short central rectrices and black mask in male, but underparts with clear separation: breast plain reddish brown or vinaceous buff, belly buff closely barred with black. Female strongly barred on upperparts too, including upperwing-coverts. Juvenile similar to female but duller.

Habitat. Savanna and open wooded plains; prefers level, sparsely vegetated ground, sometimes with rocks; also found on open margins of rivers and lakes.

Food and Feeding. No precise information available, but seeds probably important.

Breeding. Season probably extends through dry season; nests with eggs found in Jun, Aug and Oct; two juveniles collected in late May and late Oct. Nest is scrape on ground, often with some grass at the bottom. Clutch 3 eggs. No further information available.

Movements. No information; perhaps sedentary.

Status and Conservation. Not globally threatened. Reported to be widespread and rather common in W Madagascar; also common in S, but only patchy in N.

Bibliography. Appert (1972, 1996), Appert & Échécopar (1962), Bangs (1918), Benson *et al.* (1976-1977), Berlioz (1948), Dee (1986), Delacour (1930, 1932a, 1932b), Dowsett & Forbes-Watson (1993), Griveaud (1960), Kaudern (1922), Langrand (1985, 1990), Lavauden (1929a), Milon *et al.* (1973), Rand (1936), Werdning (1972), Young, G. (1995).

12. Lichtenstein's Sandgrouse

Pterocles lichtensteinii

French: Ganga de Lichtenstein **German:** Wellenflughuhn **Spanish:** Ganga de Lichtenstein
Other common names: Close-barred/Abyssinian Sandgrouse

Taxonomy. *Pterocles lichtensteinii* Temminck, 1825. Nubia.

Formerly considered conspecific with *P. bicinctus* and *P. indicus*; also closely related to *P. quadricinctus*. In past, sometimes included in genus *Eremialector*. Five subspecies recognized.

Subspecies and Distribution.

P. l. targius Geyr von Schweppenburg, 1916 - Sahara and Sahel, from S Morocco and Mauritania E to Chad.

P. l. lichtensteinii Temminck, 1825 - S Israel, Sinai, SE Egypt and Sudan to N Ethiopia, N Somalia and Socotra I.

P. l. sukensis Neumann, 1909 - SE Sudan and S Ethiopia S to C Kenya.

P. l. ingramsi Bates & Kinnear, 1937 - Yemen (Hadhramaut).

P. l. arabicus Neumann, 1909 - S Arabia, E to S Iran, S Afghanistan and Pakistan (Baluchistan, Sind).

Descriptive notes. 24-26 cm; c. 175-250 g; wingspan 48-52 cm. As *P. quadricinctus*, *P. bicinctus* and *P. indicus*, small, round-tailed, densely barred/vermiculated in both sexes, male with bands on breast and black and white pattern on forehead. Differs by having vermiculations also on neck and upper chest of males and throat of females. Male, yellowish breast patch, dull-red bill and yellow orbital ring. Juvenile, female-like, even more densely barred. Subspecies differ for general colour tones and relative width of bars.

Habitat. Deserts, semi-deserts and arid bushveld in rocky and scrubby areas, as wooded

dry wadis and hillsides, often within mountain massifs as Air, Hoggar, Ennedi and Tibesti in Sahara; prefers *Acacia* shrubs and trees, mostly *A. sayal* in Africa; avoids flat open desert and cultivated areas.

Food and Feeding. Predominantly seeds, perhaps mostly of *Acacia* (Leguminosae) but also *Asphodelus*, *Cassia*, *Prosopis*, *Salsola* and other plants. Mainly active by night, drinks after sunset and before sunrise.

Breeding. Eggs, Feb-Sep, mostly May-Jul. Nest, scrape on ground, typically among scattered trees or rocks, in the open or under low shrub. Clutch, 2-3 eggs. Male incubates by night. Downy chick described as markedly uniform warm donkey brown, slightly paler in underparts.

Movements. Sedentary, perhaps nomadic in places.

Status and Conservation. Not globally threatened. Usually in pairs or small parties. Sparsely distributed, but extensive range and often frequent to locally common. Very localised in far S Morocco. S of Jbel Bani; apparently limited to Hoggar and Tassili in Algeria; common in Adrar des Ifoghas, Mali; reportedly abundant in N Chad, especially at Tibesti and Ennedi. Locally common in SE Egypt; scarce in E Sinai and near Eilat, Israel; uncommon and local in Sudan; uncommon to frequent in Ethiopia; scattered and often uncommon in Kenya. Fairly common in the United Arab Emirates. Locally frequent in Pakistan.

Bibliography. Aspinall (1996a), Ash & Miskell (1983), Baker (1935), Britton (1980a), Bundy & Warr (1980), Cave & Macdonald (1955), Cornwallis & Porter (1982), Cramp (1985), Dowsett & Forbes-Watson (1993), Échécopar & Hùe (1964), Evans, M.I. (1994), Friedmann (1930a), Giraudoux *et al.* (1988), Goodman *et al.* (1989), Heim de Balsac & Mayaud (1962), Hùe & Échécopar (1970), Jackson (1926), Jennings (1981a, 1995), Lamarche (1980), Ledant *et al.* (1981), Lewis & Pomeroy (1989), Mackworth-Praed & Grant (1957, 1970), Meinertzhagen (1954), Newby (1979), Nikolaus (1987), Olsen (1983), Paz (1987), Porter *et al.* (1996), Richardson (1990), Roberts, T.J. (1991), Salvan (1968), Shirihai (1996), Short *et al.* (1990), Smith (1957), Snow (1978), Thomas & Robin (1977, 1983), Urban *et al.* (1986), Vaurie (1961), Walker (1981b), Zimmerman *et al.* (1996).

13. Double-banded Sandgrouse

Pterocles bicinctus

French: Ganga bibrande **German:** Nachtflughuhn **Spanish:** Ganga Bicinta

Taxonomy. *Pterocles bicinctus* Temminck, 1815. Great Fish River, south-eastern Namibia.

In past, sometimes included in genus *Eremialector*. Formerly considered conspecific with *P. lichtensteinii* and *P. indicus*; also closely related to *P. quadricinctus*. Birds from N Namibia and N Botswana were separated as race *chobiensis*, those of N Zimbabwe and Mozambique as race *usherii*, and those of W Namibia as *elizabethae*. Three subspecies currently recognized.

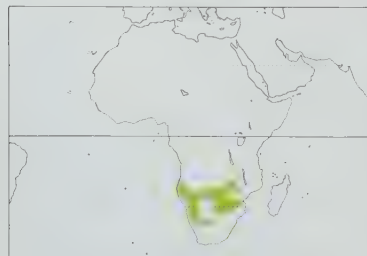
Subspecies and Distribution.

P. b. unsoergei Benson, 1947 - SW Angola.

P. b. bicinctus Temminck, 1815 - Namibia, Botswana, NW Cape Province (South Africa).

P. b. multicolor Hartert, 1908 - S and E Zambia, S Malawi and W Mozambique, S to Transvaal.

Descriptive notes. 25 cm; male c. 215-250 g, female c. 210-280 g. Among the small sandgrouse species of rounded tail and black and white design on forehead of males (subgenus *Nyctiperdix*) recalls especially *P. quadricinctus* and *P. indicus*, but male has only one black and white pectoral band, without chestnut, and broad white tips on dorsal feathers. Orbital ring yellow; bill orange. Female as *P. indicus*, with crescent-shaped dorsal marks and paler belly. Juvenile similar to adult female, less barred and with most feathers edged with buff. Subspecies separated by body size and general tone of coloration.



Habitat. Wide range of habitats, from sub-deserts to thick *Brachystegia* woodland; perhaps mostly acaciaveld and lightly wooded savannas, also bushveld; may prefer stony or rocky ground.

Food and Feeding. Seeds. Mostly inactive by day, usually feeds during early morning and late afternoon, and drinks at night.

Breeding. Breeds in winter dry season, Apr-Oct throughout range, mainly May and Oct in Namibia, May-Aug in Botswana, Jul-Aug in Transvaal. Nest, scrape on ground, sometimes scantily lined, among grasses or under shrub or tree. Clutch, 2-3 eggs, average 2.6 in Namibia. Against normal sandgrouse pattern, females in captivity incubated by night. Incubation, 23-24 days.

Movements. Sedentary.

Status and Conservation. Not globally threatened. Widespread and fairly common to common throughout range. In C Transvaal bushveld formerly quite common but now only rare vagrant. During breeding season in scattered pairs, at other seasons in flocks of up to 50 birds. Has been captive bred in the University of Wales, Cardiff, UK.

Bibliography. Benson & Benson (1977), Benson & Pitman (1964), Benson *et al.* (1971), Clancey (1967a, 1967b), Dixon (1977, 1978), Dowsett & Forbes-Watson (1993), Ginn *et al.* (1989), Hinsley (1990, 1992), Hinsley & Hockey (1989), Mackworth-Praed & Grant (1957, 1962), Maclean (1993), Newman (1996), Penry (1994), Pinto (1983), Sinclair & Davidson (1995), Snow (1978), Tarboton *et al.* (1987), Thomas & Maclean (1981), Thomas *et al.* (1981), Urban *et al.* (1986).

14. Four-banded Sandgrouse

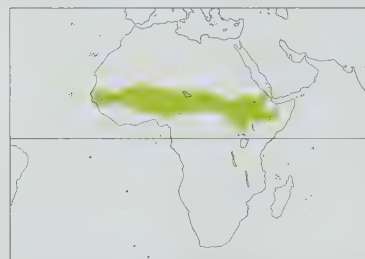
Pterocles quadricinctus

French: Ganga quadribande **German:** Buschflughuhn **Spanish:** Ganga Cuadricinta
Other common names: Lowe's Four-banded Sandgrouse

Taxonomy. *Pterocles quadricinctus* Temminck, 1815. Coromandel; error, Senegal.

Forms superspecies with *P. indicus*; also closely related to *P. bicinctus* and *P. lichtensteinii*. Birds to the E of L Chad were separated as race *lowei*. In past, sometimes included in genus *Eremialector*. Monotypic.

Distribution. Senegambia, Mali, Niger, Chad and Sudan, E to Ethiopia, S to Ghana, Nigeria, N Uganda and NW Kenya.



Descriptive notes. 25 cm. Small, with rounded tail and black and white pattern on males' forehead, as *P. lichtensteinii*, *P. indicus* and *P. bicinctus*. Male has "complex" pectoral band, with chestnut, cream-white and black bars; it differs from very similar *P. indicus* by characteristic pattern of wing-coverts; female barred, but more similar to male than in other closely related species. Bill and orbital ring yellow. Juvenile recalls adult female.

Habitat. Open or partly wooded dry savannas and bushveld; also cultivated areas; avoids deserts; prefers clay or stony soils.

Food and Feeding. No available information, before to c. 50 mins. after sunset; may drink again before sunrise.

Breeding. During dry season, Nov-Jun, mainly Mar in Senegambia, at least Feb-Mar in Sudan and Ethiopia. Nest, scrape on ground, in Sudan often among pinkish dry leaves of *Bauhinia* trees, also on bare stony soil, under shrub or among scrub or bushes. In E Africa two nests had 3 eggs, one 2 eggs.

Movements. Sedentary, locally nomadic or migratory; in W Africa moves north during wet season, e.g. in Chad mostly Jun-Oct. Vagrant to Sierra Leone, with single record in NW.

Status and Conservation. Not globally threatened. Frequent to common throughout most of area; locally common in Senegambia; common in Mali; abundant in N Ivory Coast during dry season; frequent to common in Nigeria; common in Chad S of 16°N; fairly common in Sudan; apparently uncommon in Kenya, where few records. Usually seen in pairs or small flocks.

Bibliography. Britton (1980a), Cave & Macdonald (1955), Cheke & Walsh (1996), Dowsett & Forbes-Watson (1993), Elgood, Fry & Dowsett (1973), Elgood, Heigham *et al.* (1994), Giraudoux *et al.* (1988), Gore (1990), Grimes (1987), Jackson (1926), Lamarche (1980), Lewis & Pomeroy (1989), Lewis *et al.* (1984), Mackworth-Praed & Grant (1957, 1970), Major & Cheesman (1935), Newby (1979), Nikolaus (1987), Pitman (1928), Salvan (1968), Serle *et al.* (1977), Short *et al.* (1990), Smith (1957), Snow (1978), Thiollay (1985), Urban *et al.* (1986), Zimmerman *et al.* (1996).

15. Painted Sandgrouse

Pterocles indicus

French: Ganga indien **German:** Bindenflughuhn **Spanish:** Ganga India
Other common names: Close-barred/Indian Sandgrouse

Taxonomy. *Tetrao indicus* J. F. Gmelin, 1789. Coromandel, India.

Forms superspecies with *P. quadricinctus*; also closely related to *P. bicinctus* and *P. lichtensteinii*, with both of which formerly considered conspecific. Monotypic.

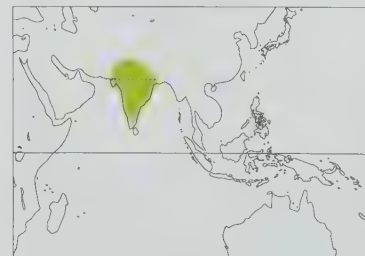
Distribution. Most of Indian Subcontinent, from Punjab and Rajasthan E to Bihar, and S to Tamil Nadu.

Descriptive notes. 28 cm; c. 170-227 g. As *P. lichtensteinii*, *P. quadricinctus* and *P. bicinctus*, small, densely barred, with short tail and black and white pattern on head of males. Very similar to *P. quadricinctus*, male with characteristic design on wing-coverts; female also with breast and neck heavily barred. Male differs from *P. bicinctus* by chestnut bar within pectoral band; female has dorsal marks more straight, not crescent-shaped, and darker belly. Bill orange-brown; orbital ring yellow. Juvenile similar to adult female, even more densely streaked and barred.

Habitat. Bare foothills and plateaux, sparsely covered with scrub or thorn bushes (*Acacia*, *Capparis*, *Ziziphus*); also in more forested country, at rocky ground, firelines and burnt areas; avoids coastal tracts.

Food and Feeding. Seeds, some shoots and apparently termites in certain seasons. Drinks after dusk.

Breeding. Perhaps mostly Apr-May-Jun, but scattered records in all other months except Jul and Sep. Scrape among stones and earth, with little or no lining; commonly shaded by bush, tree or boulder.



Clutch, usually 3 eggs, sometimes 2. Incubation period, estimated 21-23 days. Downy chick described as uniform earthy brown.

Movements. Sedentary, perhaps locally nomadic. Tends to concentrate in some areas near the end of the rains.

Status and Conservation. Not globally threatened. Moderately common in parts of India; rather rare and local, but locally frequent in Pakistan. Usually in pairs or small groups.

Bibliography. Ali (1996), Ali & Ripley (1981), Allen (1919), Baker (1935), Barton (1902), Frend (1947), Grewal (1995), Inskipp, C. & Inskipp (1991), Inskipp, T. *et al.* (1996), Mahabal & Lamba (1987), Mukherjee (1995), Ripley (1982), Roberts, T.J. (1991), Vaurie (1965), Waite (1925), Wheatley (1996).

16. Burchell's Sandgrouse
Pterocles burchelli

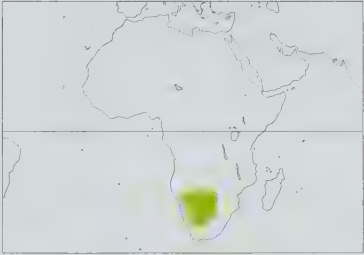
French: Ganga de Burchell **German:** Fleeckenflughuhn **Spanish:** Ganga Goteada
Other common names: Variegated/Spotted/Southern (Spotted) Sandgrouse

Taxonomy. *Pterocles (Eremialector) burchelli* W. L. Slater, 1922, near Griquatown, Griqualand West, Cape Province, South Africa.

In past, sometimes included in genus *Eremialector*, or even in monotypic *Calopteroctes*, mainly on grounds of being a rather isolated species. Birds of N Namibia and N Botswana were separated as race *makarikari*. Monotypic.

Distribution. SE Angola, Namibia and Botswana, E to SW Zambia, Zimbabwe and NW Transvaal, S to N Cape Province and W Orange Free State.

Descriptive notes. 25 cm; male c. 180-200 g, female c. 160-185 g. Small, relatively long-legged; short although pointed central rectrices; reddish general colour, with diagnostic bold white spots; underwing



deep rufous; orbital ring yellow, bill blackish. Sexes alike, but superciliary stripe, sides of face, chin and throat grey on male and yellowish-buff on female; belly paler on female. Juveniles similar to adults, male with throat and superciliary stripe greyish-buff. Northern birds somewhat paler.

Habitat. Mostly in open, semi-arid short-grass plains; also open acaciaveld; less desertic habitat than sympatric *P. namaqua*; prefers sandy ground, as red sands of Kalahari.

Food and Feeding. Seeds; in Kalahari most important *Lophiocarpus burchelli* (Chenopodiaceae). Drinks in the morning, 2 to 4 hours

after sunrise.

Breeding. Lays Apr-Oct, after rains, during winter dry season. Nest, shallow scrape on ground, often in short grass or among stunted scrub, with little surrounding cover. Clutch, 3 eggs, rarely 2. Incubation and fledging periods unknown. Young able to fly when half adult size.

Movements. Sedentary and nomadic.

Status and Conservation. Not globally threatened. Generally regarded as common; widespread and fairly common in Botswana; fairly common at some localities in W Transvaal. Usually seen single or in pairs, but often large numbers at watering points.

Bibliography. Brown (1993), Cade *et al.* (1966), Clancey (1967a, 1967b), Dixon (1977, 1978), Dowsett & Forbes-Watson (1993), Ginn *et al.* (1989), Knight (1989), Macdonald (1957), Mackworth-Praed & Grant (1962), Maclean (1968, 1993), Newman (1996), Penry (1994), Pinto (1983), Sinclair & Davidson (1995), Snow (1978), Tarboton *et al.* (1987), Urban *et al.* (1986).

Order COLUMBIFORMES

Columbiformes

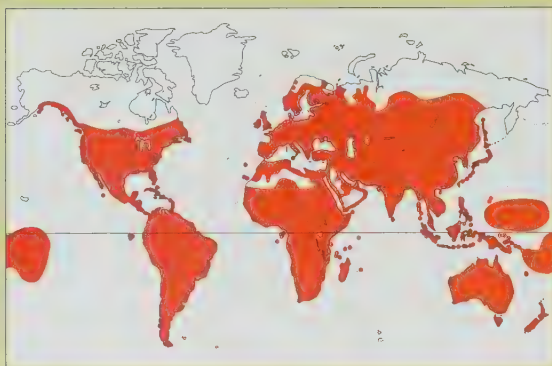
Columbidae

pigeons, doves

Class AVES

Order COLUMBIFORMES

Family COLUMBIDAE (PIGEONS AND DOVES)



- Small to large rather stocky birds with small head, short bill and short legs; flight muscles well developed.
- 15-75 cm.



- Cosmopolitan.
- Almost all terrestrial habitats, from dense forest to desert, from cool temperate zone to tropics.
- 42 genera, 309 species, 749 taxa
- 58 species threatened; almost certainly 2 of these, as well as 8 other species and 3 subspecies, extinct since 1600.

Systematics

The earliest known pigeon fossil is from the Miocene, 30 million years ago, although the family is believed to be older. Modern Columbidae are easily distinguished from other avian groups, but there is much disagreement between ornithologists as to their nearest relatives. Relationships have been proposed with the gamebirds, buttonquails, parrots, shorebirds and sandgrouse; indeed, the sandgrouse have often been included within Columbiformes. Most recently, data from DNA hybridization suggest that pigeons do not have any living close relatives, supporting the view that they merit isolation as the only extant family in Columbiformes.

In his great monograph on the family Columbidae, D. Goodwin recognized five extant subfamilies of pigeons: the "typical" mainly grey or brown seed-eating forms are placed in the subfamily Columbinae; the Pheasant Pigeon (*Otidiphaps nobilis*) in its own subfamily, Otidiphaginae; the three crowned-pigeons (*Goura*) in Gourinae; the Tooth-billed Pigeon (*Didunculus strigirostris*) in Didunculinae; and the fruit-eating doves and pigeons in Treroninae. This treatment of the group has been widely accepted and is followed herein.

Among the greatest tragedies of ornithological history may be listed the loss of the Dodo (*Raphus cucullatus*) of Mauritius, the Rodrigues Solitaire (*Pezophaps solitaria*), and the Reunion Solitaire (*Ornithoptera solitaria*), pigeon-like endemics of the Mascarene Islands in the south-western Indian Ocean (see Status and Conservation). These giants of their kind comprised a unique family, Raphidae. Male and female Dodos weighed 21 and 17 kg respectively and male and female Rodrigues Solitaires 28 and 17 kg respectively, whereas the largest living pigeons, the crowned-pigeons of New Guinea, weigh only about 2 kg.

A quick glance at the Dodo and solitaires reveals little resemblance to columbid pigeons. However, the transformation is less extreme when they are compared with pigeon squabs, or chicks. The loose and decomposed plumage, reduced wings, swollen abdomens, naked facial skin and laterally expanded horn of the bill that were present in the raphids are characteristics of pigeon squabs. These island forms in fact represent examples of paedomorphosis. The Samoan Tooth-billed Pigeon with its relatively expanded bill horn appears to be intermediate in appearance between the raphids and other extant pigeon species. The São Tome Green-pigeon (*Treron sanctithomae*) possesses a bill with the horn more expanded than any mainland pigeon and is thus also reminiscent of the raphids.

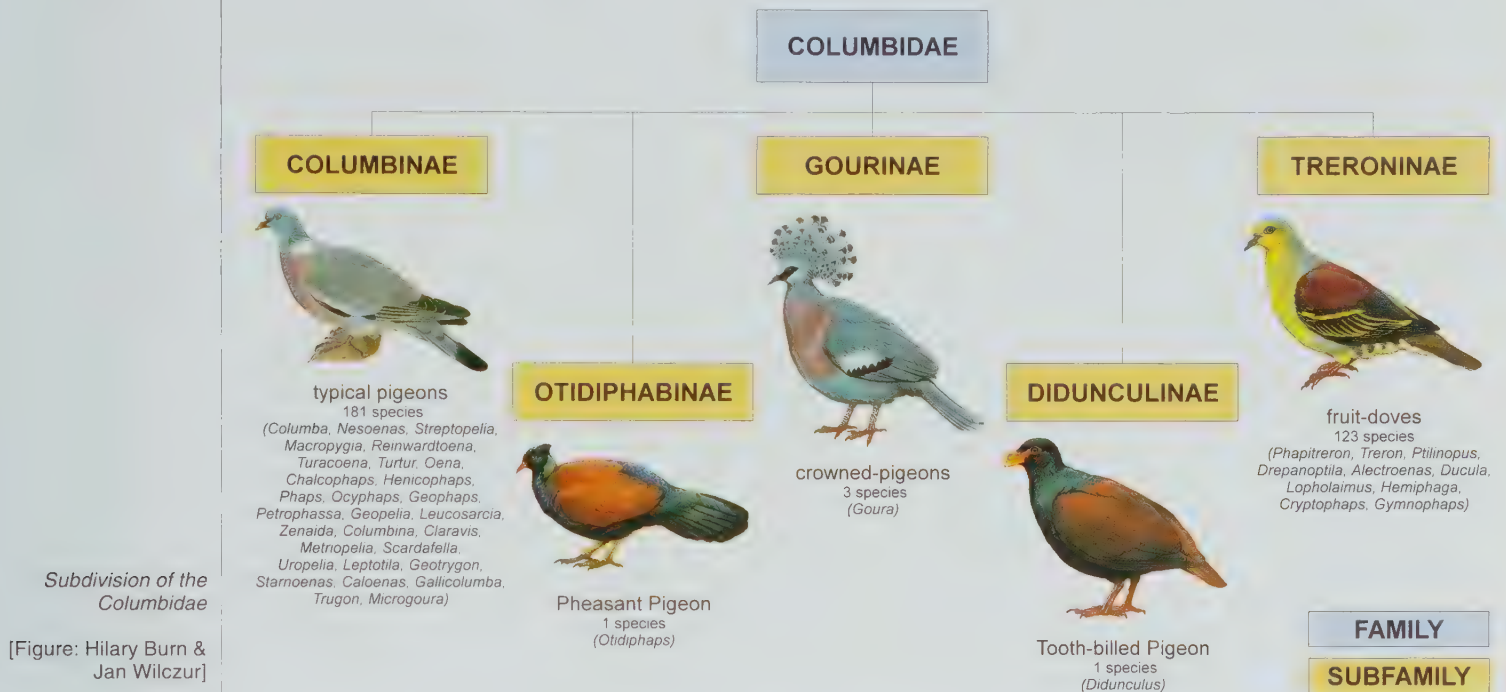
Pigeons in the genus *Columba* comprise 51 species, 34 of which are from the Old World while 17 are distributed about the

New World. These are medium-sized to large birds with square or slightly rounded tails and grey to vinous plumage. Most of them are sexually monochromatic, and most have iridescence near the neck or breast region or both.

Several lines of evidence suggest that Old World and New World members of the genus may not be closely related: these include biochemical evidence from surface antigens of red blood cells, electrophoretic patterns of egg-white proteins, and tissue proteins from heart, liver, muscle and kidney. There is also evidence from behaviour: most New World forms studied utter a specific growl call during nest display hitherto unknown in Old World forms; and during copulation-solicitation displays, females of Old World forms retract the neck while those of New World forms have the neck extended.

The Rock Dove (*Columba livia*) and its apparent close relatives, the Hill Pigeon (*Columba rupestris*), Snow Pigeon (*Columba leuconota*), Speckled Pigeon (*Columba guinea*) and White-collared Pigeon (*Columba albitorques*) are mostly cliff-dwelling and cliff- or ground-nesting. Some populations of the Pale-backed Pigeon (*Columba eversmanni*) are also cliff-dwellers, but the other members of *Columba* are mostly arboreal, although many will occasionally or even habitually feed on the ground. The genus has been broken up further into species groups based mostly on plumage. The songs of the New World forms are in most cases similar within each species group, implying that voice and morphological characters evolved together.

The taxonomy of the African Lemon-dove (*Columba larvata*), too, remains somewhat controversial. Its similarity to the Red-eyed Dove (*Streptopelia semitorquata*) in tail pattern has been suggested as being indicative of a close relationship. Some authors have remarked on its resemblance to the New World *Leptotila* in general coloration and behaviour, including posture, gait and flight-intention movements. The African Lemon-dove does not have the attenuated outermost primary and bright chestnut underwing feathers of *Leptotila*, and the two taxa further differ in the pattern of their outer tail feathers. Its long legs are an adaptation to ground-living, a convergent character shared with *Leptotila*, *Geotrygon* and *Gallicolumba*, which are also ground-foraging forms. Many authors prefer to retain the generic name *Aplopelia* for the African Lemon-dove, arguing that it is a ground-foraging, essentially seed-eating dove, but we feel that within *Columba* the degree of adaptive divergence for a terrestrial life is relatively trivial. Furthermore, it is similar in adult and juvenile plumages to other African forest doves in the superspecies group of the Western Bronze-naped Pigeon (*Columba iriditorques*), supporting the merging of *Aplopelia* into



Subdivision of the
Columbidae

[Figure: Hilary Burn &
Jan Wilczur]

Columba. Recent field work on the island of São Tomé has revealed that the local form of the lemon-dove has a stuttering call that contrasts sharply with the single-note, spaced call of the mainland form; based on differences in plumage and voice we consider that it should be recognized as a distinct species, the São Tomé Lemon-dove (*Columba simplex*).

The relationships of the Pink Pigeon (*Nesoenas mayeri*) of Mauritius are still unclear. Its colour pattern is reminiscent of some *Columba* species, and it has been merged into that genus by some workers. However, its courtship and other displays, such as the "Excitement Cry" and the contexts of its use, are similar to those in *Streptopelia*, so for the time being it seems sensible to retain this unusual pigeon in the monotypic genus *Nesoenas*, pending further studies clarifying its taxonomic status.

The 16 species of ground-feeding turtle-doves (*Streptopelia*) are distributed throughout Eurasia and Africa. They have long tails and short wings reminiscent of the Australasian genus *Geopelia*, but their nearest relatives appear to be the *Columba* pigeons. They may be divided into four species groups based mainly on plumage pattern: one group of four species, including the European Turtle-dove (*Streptopelia turtur*), is characterized by chequered wings; another group of nine species, including the Eurasian Collared-dove (*Streptopelia decaocto*), contains species with conspicuous neck bands; the Madagascar Turtle-dove (*Streptopelia picturata*) is more heavily built and has longer legs than its congeners, and is sometimes placed in *Columba*; and the Spotted Dove (*Streptopelia chinensis*) and Laughing Dove (*Streptopelia senegalensis*) differ from the other members of the genus in lacking the excitement cry that is so typical of the others.

The cuckoo-doves (*Macropygia*) are distributed through the Oriental and Australasian regions and number 10 species, which may be divided into two groups based on size. Their long tails and barred plumage are reminiscent of cuckoos, whence their vernacular name. Their relationships are uncertain, but two other genera are usually considered to be associated. The long-tailed pigeons of the genus *Reinwardtoena* are noticeably larger than *Macropygia*, and have thicker bills and unbarred plumage. Two slaty black members of this group are placed in the genus *Turacoena*: their tails are more rounded, less graduated, than in the other cuckoo-doves; their relationship with *Macropygia* has been disputed.

The five members of the African "spotwing" group of doves in the genus *Turtur* are characterized by a barred lower back, iridescent wing spots, and chestnut on the wings. They are forest- and scrub-dwelling species, and all have similar stuttering songs. The diminutive Namaqua Dove (*Oena capensis*) shares the back barring and wing spots with the spotwings, but its dis-

plays and vocalizations are quite different, while it also has a very long tail and males have black masks. Nevertheless, on rare occasions Namaqua Doves may produce a stuttering song indicating a none-too-distant relationship with *Turtur*.

The two small doves in the genus *Chalcophaps* appear to be intermediate between the African spotwings and the Australian bronzewings (*Phaps*). They possess rump bars reminiscent of spotwings and have chestnut-marked primaries and iridescence reminiscent of the bronzewings. Stephan's Dove (*Chalcophaps stephani*) is restricted to Sulawesi, New Guinea and the Solomons, whereas the Emerald Dove (*Chalcophaps indica*) is more widespread, being distributed through many parts of the Oriental and Australasian regions. Their relationships with other pigeons constitute yet another field of uncertainty. The New Guinea Bronzewing (*Henicophaps albifrons*) and the New Britain Bronzewing (*Henicophaps foersteri*) are larger than *Chalcophaps*, and have stronger bills, but shared details of plumage indicate a relationship with that genus.

The Australian bronzewings are commonly divided into four genera, *Phaps*, *Ocyphaps*, *Geophaps* and *Petrophassa*. The Crested Pigeon (*Ocyphaps lophotes*) is the most arboreal species within this distinctive complex. It displays with spread wings like the other bronzewings, and shares plumage patterns with Spinifex Pigeon (*Geophaps plumifera*), which itself is sometimes placed in its own genus *Lophophaps*. Apart from the Crested Pigeon, all other members of this group are largely terrestrial, the degree varying with the species.

The five small doves in the genus *Geopelia* are probably relatives of the bronzewings. The displays of the three Australian species consist of a low bow with the partly raised wings presented frontally, and the tail raised and spread. The Diamond Dove (*Geopelia cuneata*) is an Australian endemic. The Bar-shouldered (*Geopelia humeralis*) and Peaceful Doves (*Geopelia placida*) are also found in New Guinea, the latter with two allospecies, the Zebra Dove (*Geopelia striata*) in Sundaland and the Philippines, and the Barred Dove (*Geopelia maugei*) in the Lesser Sundas.

There is disagreement as to the relationship of the large Wonga Pigeon (*Leucosarcia melanoleuca*) to other pigeons. One opinion is that it is an ancient Australian endemic with no close relatives. The other view is that it is an early offshoot of the bronzewing group, adapted to life in rain forest. Although the Wonga Pigeon has no iridescent bronze on its wings, it erects and spreads its tail during its "Bow Display", and is thus reminiscent of the bronzewings; it also shares some details of its plumage pattern with some bronzewings.

Probably the most famous pigeon in the New World is the Passenger Pigeon (*Ectopistes migratorius*), now tragically extinct (see Status and Conservation). Its plumage pattern suggests a fairly close relationship with the American Mourning Dove (*Zenaida macroura*), although it was somewhat larger. The American Mourning, Socorro (*Zenaida graysoni*), Eared (*Zenaida auriculata*) and Zenaida Doves (*Zenaida aurita*) have very similar visual displays and vocalizations. The Socorro Dove has been considered conspecific with the American Mourning Dove, but differences in voice, visual displays, plumage, structure of the protein lactic dehydrogenase, and immunology have prompted investigators to raise it to full species status. Moreover, F1 hybrids of *Z. graysoni* x *Z. macroura* are mostly sterile when mated *inter se*, and are only fertile when backcrossed to either parental type.

The Galapagos Dove (*Zenaida galapagoensis*) has 12 tail feathers instead of the 14 typical of the genus, and it shares this character with the Zenaida Dove. Its facial and wing markings also resemble the Zenaida Dove, but its very distinct displays and muted, simplified vocalizations suggest that it may not be a member of the genus *Zenaida* at all. In the meantime, for want of more extensive evidence, it is still tentatively classified in this genus, pending further study.

The White-winged (*Zenaida asiatica*) and Pacific Doves (*Zenaida meloda*) are commonly considered conspecific. However, their soft part colours and songs differ, the song of the Pacific bearing striking resemblance to that of the Pale-vented Pigeon (*Columba cayennensis*), so it seems reasonable that they should be treated as two distinct species. Their placement in the genus *Zenaida* is also to be questioned. Displays of *Zenaida* doves are very conservative, and these two species perform "Bow Coos" which are absent in the other members of the genus, while their songs also differ considerably from those of the other *Zenaida* species, all of which have very similar songs. We feel that the affinities of the White-winged and Pacific Doves are probably with New World *Columba*, but they are here tentatively retained in *Zenaida*.

The 17 diminutive American ground doves are divided into five genera. The seven species of the genus *Columbina* are small doves, the males of which are slightly brighter than females. The Blue-eyed Ground-dove (*Columbina cyanopsis*) differs from the

other six in having an attenuated outermost primary. The three members of the genus *Claravis* are sexually dichromatic, males being predominantly blue and females brown; they are larger than the *Columbina* doves and all have attenuated first primaries.

The Inca Dove (*Scardafella inca*) and Scaled Dove (*Scardafella squammata*) have sometimes been merged into *Columbina*, but both raise and spread the tail during the Bow Coo, behaviour reminiscent of the Old World *Geopelia*. In addition, both *Scardafella* have spectrographically similar vocalizations which differ considerably from those found in *Columbina*, and both also lack signal spots on their wings, so there do appear to be reasonable grounds for retaining *Scardafella*.

The four members of the genus *Metriopelia* have proportionately larger wings than the other ground doves and indentations in the inner webs of the ninth and tenth (outermost) primaries, and all have orange orbital skin. They appear to be the descendants of a *Columbina*-like ancestor that became adapted to living at high altitudes. The Long-tailed Ground-dove (*Uropelia campestris*) has characters shared with *Claravis* and *Columbina* and its position remains unclear, so it is generally retained as a distinct genus pending further studies.

The 11 doves comprising the genus *Leptotila* are characterized by rufous on the axillaries and underside of the wings, a short to relatively short white-tipped tail consisting of 12 feathers, and an attenuated outermost primary. They all look similar to each other and may often be distinguished by the colour of the eye or the bare eye-ring. They may be divided into three species groups, based on plumage.

The 16 species of quail-dove comprising the genus *Geotrygon* are long-legged terrestrial forms reminiscent of the Old World *Gallicolumba* ground doves. All *Geotrygon* have brown or purplish brown bodies, often suffused with green or purple iridescence, and all have distinct facial markings reminiscent of the facial stripes found in *Zenaida*; these facial markings are thought to be homologous in the two genera and indicative of close relationship. All *Geotrygon* lay cream-coloured eggs.

The monotypic Cuban Blue-headed Quail-dove (*Starnoenas cyanocephala*) possesses facial markings similar to those in *Geotrygon*. However, it has a black bib bordered by white, and it also differs from *Geotrygon* in possessing hexagonal scales on



The Barred Dove of the Lesser Sundas was formerly treated as a race of the Zebra Dove (*Geopelia striata*) but it is now usually considered to be a full species. *Geopelia*, numbering five species, is probably close to the four genera of small Australian doves known collectively as the bronzewing group. The Barred Dove has a bright yellow eye-ring and is considerably darker than all forms of the Zebra Dove, with strong barring across the entire breast, and more chestnut on the wings; there are also considerable differences in voice. *Geopelia* is confined to the Australasian and Indo-Malayan regions.

[*Geopelia maugei*, Sumba, Indonesia. Photo: Michael Riffel]

the front of its legs, and by laying white eggs. It may have a common ancestor with *Geotrygon*, or it may be representative of a different lineage of doves long extinct; biochemical data may throw some light on this mystery.

The Nicobar Pigeon (*Caloenas nicobarica*), the only surviving representative of its genus, occurs only on islands but is widespread from the Nicobars to the Solomons; fossils of a larger extinct form, *Caloenas canacorum*, have been found in New Caledonia and Tonga. It has been suggested that the Nicobar Pigeon is related to the *Gallicolumba* complex, although it has a threat display reminiscent of *Treron* and head-nodding movements reminiscent of some *Ptilinopus*. A detailed study of the displays of this species is highly desirable.

The 18 species comprising the Old World ground doves (*Gallicolumba*) are long-legged with plump, compact bodies and short to medium-length wings. In appearance and behaviour they are somewhat reminiscent of partridges. All are forest birds, spending most of their time on the forest floor. They may be divided into two species groups. The first group of seven species includes the five "bleeding-heart" doves, so-named because of the spot of various shades of red in the middle of the breast. The other two members of this group, the Cinnamon (*Gallicolumba rufigula*) and Sulawesi Ground-doves (*Gallicolumba tristigmata*), share colour patterns with the bleeding-hearts. Bleeding-hearts and their relatives tend to crouch with the head lowered and the tail raised when alarmed, an attitude apparently absent in the other group. The 11 species of the second group are easily distinguished from members of the first group, and indeed they were formerly placed in a separate genus, *Terricolumba*. The most notable feature of this second group is that the face and breast are sharply demarcated in coloration from the rest of the body, but they also have various amounts of iridescence on their wings or on the wings and mantle.

The Thick-billed Ground-pigeon (*Trugon terrestris*) of New Guinea is a large ground-living form with a black and white underwing pattern similar to those found in some *Gallicolumba* species. Its colour pattern is also reminiscent of the Choiseul Pigeon (*Microgoura meeki*), and *Trugon* may be a link between these other two genera. *Microgoura* has a small crest similar to those of the crowned-pigeons (*Goura*), and may, in turn, be a link between *Trugon* and the large crowned-pigeons.

The Pheasant Pigeon of New Guinea and nearby islands is markedly terrestrial in its habits. It is a relatively poor flier as evidenced by its relatively small, rounded wings, and greatly reduced furcula. Its long, laterally compressed tail is reminiscent of that of the Kalij Pheasant (*Lophura leucomelanos*). In addition to its appearance, it is worth noting that its movements and displays (see Breeding) are also very pheasant-like. The Pheasant Pigeon's relationships are shrouded in mystery.

The three crowned-pigeons of New Guinea are the largest members of the family. They are all rather fowl-like in appearance and behaviour, and all possess a laterally compressed, fan-shaped crest and mostly blue-grey plumage with white or greyish white wing patches. They have no obvious close relatives.

The Samoan Tooth-billed Pigeon is another highly distinctive form. It possesses an inflated bill, a character not shared with any extant pigeon, and, as already remarked, somewhat recalling the extinct Raphidae. When feeding, it uses its foot to hold down food items, a form of behaviour known for only one other pigeon, namely the Marquesas Ground-dove (*Gallicolumba rubescens*).

The three fruit-eating species of the genus *Phapitreron* are endemic to the Philippines. The Dark-eared Brown-dove (*Phapitreron cinereiceps*) is sometimes considered a subspecies of the Amethyst Brown-dove (*Phapitreron amethystina*), but the two apparently occur sympatrically on Mindanao without interbreeding, so they are probably better treated as full species. Although the White-eared Brown-dove (*Phapitreron leucotis*) weighs more on average than the Amethyst Brown-dove (117.8 g as against 100.7 g), both the bill and the stomach of the latter species are larger, indeed the stomach muscles of the Amethyst weigh twice as much as those of the White-eared; this probably reflects different food habits which enable them to exist sympatrically throughout much of their respective ranges. Their taxonomic relationships with other pigeons remain to be determined.

The green-pigeons (*Treron*) differ from the *Ptilinopus* fruit-doves in having a narrower gut and a gizzard modified for grinding seeds of the figs which comprise much of their diet. They are mainly coloured soft green with yellow or olive tints, and most have dark flight-feathers with yellow wing markings. They are highly arboreal and, unlike other pigeons, which utter the famil-



When first named, the Madagascar Turtle-dove was placed in the genus *Columba*, but it was later transferred to *Streptopelia*.

It is more robust and longer-legged than other *Streptopelia* species and is markedly terrestrial, feeding on seeds, fallen fruits, and invertebrates. The question of its generic placement is by no means solved, however, and many authors still believe that it is better placed in *Columba* after all.

It may be a derivative of the ancestral African Lemon-dove (*Columba larvata*), its long legs being purely an adaptation to a terrestrial lifestyle.

[*Streptopelia picturata* picturata, Madagascar.
Photo: Roland Seitre/Bios]



Many pigeons have crests but the Topknot Pigeon of eastern Australia is unique in having a double ornamentation; the crest on the forehead is grey while that on the crown and nape is rusty and black in colour; both crests are erected during courtship. Other peculiarities, such as a laterally compressed bill and many aspects of sexual display, mean that the species appears to be only distantly related to other Columbidae and is presumably an ancient Australian endemic.

[*Lopholaimus antarcticus*, Lamington National Park, Queensland, Australia. Photo: Glen Threlfo/Auscape]

lar "coo", they may produce whistles and quacking duck-like vocalizations. They were formerly divided into two genera, with the pin-tailed forms placed in the genus *Sphenurus*, and the short-tailed species in *Treron*. However, plumage similarities indicate that they are best treated as one genus which may be divided into three species groups.

The 51 species of fruit-dove in the genus *Ptilinopus* are mostly rather heavily built, short-tailed arboreal doves ranging from the sparrow-sized Dwarf Fruit-dove (*Ptilinopus nanus*), weighing only 49 g, to the 257 g Pink-spotted Fruit-dove (*Ptilinopus perlatus*), and on to the extreme case of the south Australian race of the Wompoo Fruit-dove (*Ptilinopus magnificus*), which can weigh around 470 g or more. They are all fruit- and berry-feeders although they may take some insects too. Remarkably, the Atoll Fruit-dove (*Ptilinopus coralensis*) has been observed eating lizards. Although vocalizations and displays of most species remain undescribed, it is likely that these will prove useful in clarifying taxonomic relationships within and between groups. For example, the Pink-headed (*Ptilinopus porphyreus*) and Black-backed Fruit-doves (*Ptilinopus cinctus*) are very different in coloration but they do share colour patterns. They also have similar displays and calls supporting their placement in the same species group. The Atoll Fruit-dove has been treated as a subspecies of the Grey-green Fruit-dove (*Ptilinopus purpuratus*) by some, but it has very distinct vocalizations, and is very sleek in appearance and terrestrial in habits, thus differing notably from other fruit-doves, so should probably be retained as a distinct species. There is disagreement as to the relationships of some *Ptilinopus* species with each other. Some fall into obvious species groups: for example, the three Fijian species, the Orange Dove (*Ptilinopus victor*), Golden Dove (*Ptilinopus luteovirens*) and Whistling Dove (*Ptilinopus layardi*), form a distinct group and are sometimes placed in a separate genus, or subgenus, *Chrysoena*. Another group, to which the Pink-headed and Black-backed Fruit-doves belong, is characterized by having the region of the head patternless and the neck and breast partitioned off from the lower body by one or two bands; this group is sometimes treated as the subgenus *Leucotreron*. The other fruit-doves are sometimes placed in two other species groups but the characters chosen to separate them are not altogether clear. Apparently allied to this group is the Cloven-feathered Dove

(*Drepanoptila holosericea*) of New Caledonia, a species sufficiently distinct to be awarded its own monotypic genus.

The three blue-pigeons (*Alectroenas*) of Madagascar and other Indian Ocean islands are all allopatric and closely related. They are reminiscent of the Speckled Pigeon in having well developed red orbital skin and deeply bifurcated neck feathers. However, their anatomy and the colour of the juvenile plumage indicate that their closest relatives are the *Ptilinopus* fruit-doves and the imperial-pigeons (*Ducula*).

Some of the Old World imperial-pigeons fall into obvious species groups whereas others are less easy to situate. For example, the Pied (*Ducula bicolor*), Torresian (*Ducula spilorrhoa*) and White Imperial-pigeons (*Ducula luctuosa*) form a distinct group. Another group comprises the seven forms with enlarged nasal ceres, for example the Micronesian (*Ducula oceanica*) and Red-knobbed Imperial-pigeons (*Ducula rubricera*), and these in turn fall into two superspecies groups. In contrast, the Grey-necked (*Ducula carola*) and Zoe's Imperial-pigeons (*Ducula zoeae*) are difficult to relate to other forms with any certainty.

The Topknot Pigeon (*Lopholaimus antarcticus*) of eastern Australia is unique in having a laterally compressed bill and a frontal as well as an occipital crest. It is reminiscent of the New Zealand Pigeon (*Hemiphaga novaeseelandiae*) in that both have the top of the cere feathered and both have 12 tail feathers. Both these species and the Sombre Pigeon (*Cryptophaps poecilorrhoa*) cannot be assigned to any living group of pigeons.

Finally, the three mountain-pigeons (*Gymnophaps*) have sometimes been allied with *Columba*, but studies of their alimentary system, together with field observations, indicate that they are fruit-eaters. As there are also some plumage similarities with *Ducula*, it is likely that their closest relatives are actually the imperial-pigeons.

Morphological Aspects

Extant Columbidae species range in size from the tiny, almost sparrow-sized Common Ground-dove (*Columbina passerina*) weighing about 30 g to the turkey-sized crowned-pigeons of New Guinea, which weigh over 2000 g. The smaller members of the family tend to be called "doves" and the larger ones "pigeons",



As is usual in birds, pigeon plumage colour is often an adaptation to the environment. The Caribbean Dove feeds on the ground, walking around quickly under cover, picking up seeds, and occasionally nesting there too. Appropriate to these terrestrial birds, the upperparts are a cryptic, faintly bronzed olive brown; indeed, all 11 species in the rather uniform genus *Leptotila* are similarly coloured. The White-bellied Green-pigeon, on the other hand, belongs to an arboreal genus, the vernacular name for the group referring to the principal coloration of most of its members. They are fruit-eaters, rarely coming to the forest floor, and well camouflaged for a life in the dense foliage of tropical and subtropical forests.

[Above: *Leptotila jamaicensis collaris*, Grand Cayman Island. Photo: Michael Gore

Below: *Treron sieboldii*. Photo: Kenneth W. Fink]

but this distinction in popular usage does not have any firm basis: size does not always distinguish the two classes; nor are there anatomical or ecological differences separating the family into these two groups. Indeed, "dove" and "pigeon" are sometimes used interchangeably for some species: for example the Rock Dove is sometimes referred to as the Rock Pigeon, and its domestic and feral forms are regularly referred to as "pigeons", notably the ubiquitous feral pigeon. Therefore, when talking of the Columbidae in general, the terms dove and pigeon are normally used indistinctly, as herein.

The typical pigeon tends to have a short bill, a small head, a compact body and short legs. The bill tends to consist of a tumid basal portion covered by soft skin, the cere, and a horny distal portion. The nostrils are narrow and may be longitudinal or oblique, overhung by a valve-like scale or operculum. The middle portion of the bill tends to be constricted, giving it a plover-like appearance in profile. The eyes are surrounded by a space of bare skin which varies considerably in colour depending on the species, for instance red, blue, yellow or white. The forward toes are cleft to the base, although on occasion a slight membrane may bridge the middle and outer toes.

Pigeons tend to have larger wings with lower wing-loading relative to other avian groups. However wing-loading, calculated as weight divided by wing area, also increases with body mass, so the Common Ground-dove, weighing 37 g, has a wing-loading of only 0.35, whereas, at 338 g, the Band-tailed Pigeon (*Columba fasciata*) has a wing-loading of 0.56. An Eared Dove weighing 137 g has a wing-loading of 0.43 and is intermediate between the aforementioned two species. The greater the wing-loading the faster a bird must fly to prevent stalling.

Flight muscles in pigeons tend to be larger in comparison to those in other avian groups. They make up 31-44% of the body weight as compared, near the other extreme, to 17% in cormorants and 14% in grebes: cormorants and grebes are excellent swimmers and divers but are renowned as heavy, very poor fliers. The highly developed flight muscles in pigeons reflect their superior flying abilities.

Speed of flight is determined by the shape and size of the wing and the rate of wingbeats, as well as the angle of attack. Aspect ratio is an index of wing shape, being the ratio of the wing length to the wing width: a high aspect ratio would indi-

cate a long, narrow wing which adapts a bird for speedy flight; a low aspect ratio would indicate a short, broad wing, an adaptation for rapid take-off. The Band-tailed Pigeon, a powerful flier, has an aspect ratio of about 1.98, whereas a Common Ground-dove has an aspect ratio of about 1.59, an adaptation for explosive take-off. The shape of the wing often reflects the bird's migratory habits. For example, a highly migratory *Coturnix* quail has wings with an aspect ratio of about 2.15, whereas a sedentary *Colinus* wood-quail has an aspect ratio of about 1.74. A parallel example may be found in quail-doves: the migratory Ruddy Quail-dove (*Geotrygon montana*) has an aspect ratio of 1.85, whereas that of the sedentary Costa Rican Quail-dove (*Geotrygon costaricensis*) is of merely 1.59.

Relatively large, broad wings give greater manoeuvrability during flight. A long tail also assists in quick changes of direction and in landing. For example, the Brown Cuckoo-dove (*Macropygia phasianella*) has rounded wings with a long tail enabling it to fly swiftly and strongly through the understorey and to manoeuvre between tree trunks.

Pigeons' legs tend to be short to medium-length as compared to other birds. The arboreal *Columba* species and fruit-eating forms such as *Ptilinopus*, *Ducula* and *Macropygia* are capable of gripping a branch forcefully, enabling them to hang upside-down during foraging bouts. In contrast, some of the terrestrial gamebird-like pigeons have longer legs, as befits a lifestyle based mainly on the ground.

Pigeons are unique among birds in that their young are fed on a nutritious substance known as "crop-milk". This substance resembling cottage cheese is produced in the bilobed crop, which consists of two sac-like structures that connect with the oesophagus just in front of the breast bone. The hormone prolactin from the pituitary stimulates several cell layers lining the crop to thicken as they are engorged with nutrients transported to them by a mass of blood vessels. The epithelia (cell layers) become highly folded as the cells continue to thicken. The crop now functions as a holocrine gland, and entire nutrient-rich cells are sloughed off into the sac cavity or lumen, where they are stored as crop-milk. A young bird stimulates its parent to regurgitate crop-milk by inserting its bill into the latter's buccal cavity.

Pigeons may be broadly divided into seed-eating and fruit-eating species. The seed-eating forms (Columbinae) tend to be



Some pigeons have remarkably long tails, notably the Great Cuckoo-dove. Long tails increase the manoeuvrability of tropical forest-dwellers as they weave between the trees. This species, which occurs from the Moluccas to the islands off eastern New Guinea, is most distinctive when seen in flight across a forest clearing, the long black primaries lending a graceful appearance combined with high speed. When the graduated tail is spread, the outer tail feathers, grey with black bands, become clearly visible.

[*Reinwardtoena reinwardtii*.
Photo: Kenneth W. Fink]



The Comoro Blue-pigeon is one of three surviving species in the genus *Alectroenas*; a fourth, the Mauritius Blue-pigeon (*A. nitidissima*) is now extinct, having been exterminated around 1830. These large frugivorous pigeons are restricted to Madagascar and other islands of the western Indian Ocean, possibly representing a westward extension of the *Ducula*-*Ptilinopus* group. Characteristic external features of the Comoro Blue-pigeon include the large area of red orbital skin and the pointed, bifurcated neck feathers, here raised to striking effect. Interestingly, the Speckled Pigeon (*Columba guinea*) of Africa also exhibits these two features but this would appear to be due to convergence, as the two genera are not thought to be closely related.

[*Alectroenas sganzini*
minor, Aldabra.

Photo: Gilles Martin/Bios]



Sexual dichromatism is unusual in pigeons, but one such case is that of the Namaqua Dove. The male's handsome black face and breast, together with the brightly coloured bill, contrast sharply with the much duller, greyer plumage and bill of the female. The selection pressures that result in such differentiation of the sexes are always complex and difficult to specify, but sexual selection must be uppermost. This dove's breeding habits appear no different from those of similar species and it is apparently monogamous, but its nomadic habits might be of some significance. Sexual dichromatism in pigeons almost always takes the form of colour differences around the head, neck or breast, the parts that are most prominent in sexual display.

[*Oena capensis capensis*, Samburu National Park, Kenya.
Photo: Günter Ziesler]

clad in buffs, greys or various shades of brown. The only exceptions to this rule are the two *Chalcophaps* doves, which have the entire wings iridescent green. Granivorous pigeons may sometimes have iridescent purples or bronzes around the neck, breast or back, or iridescent markings on the wings. Some have iridescent black facial markings.

The true fruit-doves (*Ptilinopus*), in contrast, can be very gaudily coloured and some may be ranked among the gems of the ornithological world. Most are bright green but they may have ornaments of red, purple, pink, yellow, black or white on the crown, breast, rump or undertail-coverts. The male Orange Dove of Fiji is bright orange all over, apart from its olive and yellow head. The blue-pigeons (*Alectroenas*) of the Indian Ocean are mostly azure-coloured. The green-pigeons (*Treron*) tend to be more sombrely clad in quiet greens, sometimes decked with patches of pastel pinks, oranges, greys and yellows.

Different species range from being sexually monochromatic to partly dichromatic or even extremely dichromatic. For example, with the exception of the Tambourine Dove (*Turtur tympanistria*), the small *Turtur* doves of Africa are sexually monochromatic, as is the Black-backed Fruit-dove of the Indonesian region. In contrast, the male Orange Dove mentioned above is mostly bright orange, whereas the female is a cryptic green. One would naturally think that bright colours are disadvantageous and attractants to predators but this may be misleading, for field observations have shown that a male Orange Dove sitting on a tree blends in and resembles the many dead leaves hanging on surrounding branches. Some species are only partially sexually dichromatic: for example, male Rock Doves and Common Ground-doves are only slightly brighter coloured than their females.

Colours and colour patterns in the plumage are undoubtedly selected for in the business of enhancing species recognition and as barriers to hybridization between species. Cross-fostering

experiments with African Collared-doves (*Streptopelia roseogrisea*), American Mourning Doves and colour morphs of domestic pigeons have shown that these birds sexually imprint on their foster parent species. Thus, species-specific visual characters are learned during an early stage of the pigeon's life, the "sensitive phase" of the ethologist.

In addition to their coloured feathers, pigeons are often ornamented with crests, for example the Crested Quail-dove (*Geotrygon versicolor*) and the Spinifex Pigeon. A hypertrophied cere, as in the Nicobar Pigeon, or a highly hypertrophied eyering, as in the Diamond Dove, are features that are important in displays and undoubtedly serve in sexual and species recognition too; very often the colour of the iris is different from that of the eye-ring, thus forming a marked contrast.

Pigeon nestlings hatch with a sparse covering of down which may be white, yellow, brown, or grey depending on the species. Downy plumes are soon replaced by the first coat of feathers, the juvenile plumage. Down is attached to the tips of the growing feathers and is either broken or worn off, and the nestling is soon covered with feathers, but plumage development is not necessarily complete when the young birds make their first flights: primaries and secondaries are often still growing at the time the young leave the nest.

The post-juvenile moult, also known as the first pre-basic moult, begins soon after fledging. Through this moult fledglings replace their juvenile feathers with adult plumage. In Rock Doves the first pre-basic moult begins at 40-50 days. In Common Woodpigeons (*Columba palumbus*) this moult begins at about six weeks old, in Black-banded Fruit-doves (*Ptilinopus alligator*) at 60 days, and in Torresian Imperial-pigeons at 150 days.

Due to wear and tear or damage from feather mites, feathers have to be replaced annually; this takes place after the breeding season. In temperate climates, the short photoperiod of the late summer and autumn is in part responsible for triggering moult.

Experiments with captive pigeons demonstrated that birds kept at a regime of four hours of light per day finished moulting two weeks earlier than birds kept at 12 hours. Pigeons kept at a photoperiod of 8-10 hours between December and May will begin moulting in March, 4 weeks in advance of those kept at 12-14 hours.

Migratory species like the Oriental Turtle-dove (*Streptopelia orientalis*) complete their moult much faster than sedentary forms such as the wild Rock Dove. Sedentary species tend to have longer breeding seasons and are not under pressure to finish moulting in preparation for an autumn exodus.

In mild climates, suitable breeding conditions may arrive at the time moult is about to begin or when it is already under way. Breeding and moulting are both energetically expensive, so there is a conflict between the two processes in terms of energy allocation relative to each activity. In such cases, moulting of the flight-feathers is typically arrested until breeding is completed, a process which has been documented in a number of species including Laughing and Spotted Doves, the Spinifex Pigeon, various fruit-doves including some *Ptilinopus*, and also in feral pigeons.

Doves have evolved special anatomical and behavioural mechanisms enabling them to thrive in habitats with extremely high or extremely low temperatures. Birds, unlike mammals, have no sweat glands, so excess body heat is dissipated by means of panting, gular fluttering (fluttering the skin around the throat region), and cutaneous water loss, that is through the skin. Evaporating water released from the mouth or skin takes with it heat energy, thus lowering the body temperature. Doves have, in addition, a unique vascular plexus in the integument surrounding the oesophagus. This plexus is located in the subcutaneous fascia of the neck region, forming a collar around the throat and the sides of the neck. There is variation in the distribution of this plexus: in the Rock Dove, it extends beyond the hyoid onto the skull and the collar is complete; but in the African Collared-dove, the collar is restricted to the neck region and is incomplete, with a break at the dorsal mid-line of the neck. The plexus is suffused with a dense mat of blood vessels. A heat-stressed dove inflates and deflates its oesophagus in a pulsing rhythm. The inflated oesophagus touches the plexus and heat is transferred from the plexus onto the outer walls of the oesophagus, then onto the moist mucous surface of the inner oesophageal wall, the oesophageal mucosa, and hence expelled via water evaporation. Doves possess a second vascular plexus, the rete mirabile ophthalmicum, situated below the ear-coverts, which serves to keep the temperature of the brain lower than that of the body.

Detailed studies of the desert-living Spinifex Pigeon of Australia have revealed a number of behavioural and physiological adaptations permitting this species to thrive and breed in one of the hottest places in the world. These doves avoid exposure to high temperatures by foraging in the shade during the late morning hours, while the hottest part of the day is spent resting between crevices and cracks among large boulders. In addition, the Spinifex Pigeon has a lower basal metabolic rate than other birds of its size, and this has been calculated as only 68% of the allometric prediction. The species has a high upper critical temperature of 45°C, and gular fluttering was observed only when ambient temperatures exceeded 45°C, but even then it was only intermittent. Heat is dissipated primarily through the skin, by cutaneous evaporative water loss, when the bird is heat-stressed. Cooling by cutaneous heat loss appears to be the predominant mechanism in the Spinifex Pigeon and has also been experimentally demonstrated in domestic pigeons and American Mourning Doves.

At the other extreme, in response to cold a dove erects its feathers but only so far that the feather tips touch each other to trap a layer of air around the bird's body. This trapped air, warmed by the bird's body heat, helps it maintain a relatively high temperature, which explains why birds in cold weather puff themselves up like balls. An overheated bird, on the other hand, raises its feathers, in a process known as piloerection, so that the tips do not touch and in profile the edges look jagged. This enables air to pass in between the feathers and also may ensure maximum cutaneous water evaporation by convective airflow.



Some pigeons are among the largest arboreal birds, and when perched on an exposed branch on a breezy day the effort required to remain in place can be considerable.

Pigeons, especially the tree-dwellers, tend to have relatively short legs, giving a low centre of gravity, which, combined with powerful gripping muscles and a large functional hind toe, helps them to maintain their position and dignity when perched.

Indeed, many large fruit-eating species will happily hang upside-down or venture out onto the thinnest twigs to reach their favourite foods.

Pigeons of the genus *Columba* actually possess virtually all of the different types of leg muscle known in birds, a quite unusual situation. The Red-billed Pigeon of northern Central America is a bird of forest edge and clearings, that often forages on the ground. In places it is regarded as an agricultural pest, since it eats sprouting cereals such as maize and sorghum.

[*Columba flavirostris*,
Costa Rica.
Photo: Michael &
Patricia Fogden]



A textbook illustration of wing feathers, created by the contrast between white underwing-coverts and black primaries and secondaries, is provided by this Pied Imperial-pigeon. Members of the Columbidae have 11 primaries, 10-15 secondaries (including tertials), and 12-22 tail feathers. Depending on habitat, the broad wings are long or short, but are always rounded at the tip. Pigeons are among the most powerful and agile fliers in the bird world, and their flight muscles are relatively larger than in most bird groups.

[*Ducula bicolor*,
Philippines.
Photo: Günter Ziesler]

Habitat

Pigeons and doves are to be found throughout the world except for the high Arctic and Antarctica. They are one of the most successful families of birds in the world and have radiated to some 309 extant species, inhabiting diverse habitats.

Most members of the Columbidae are capable of powerful flight which enables them to cross large bodies of water to colonize oceanic islands. The islands of the Pacific Ocean, for example throughout Polynesia, Melanesia or the New Guinea area, are replete with pigeon species. New Guinea is home to some 44 pigeon species, and some 27 species occupy islands in the tropical South Pacific. Three species of dove live on the Revillagigedo Archipelago about 645 km west of Colima on the Mexican west coast. The ancestors of the Galapagos Dove had to cross some 968 km of the Pacific Ocean to reach its present home, while the forerunners of the Azores race, *azorica*, of the Common Woodpigeon had to traverse 1259 km of ocean to colonize these Atlantic islands.

Pigeons occupy a wide range of habitats from forest to open country. Forest types include lowland rain forest, highland forest, tropical deciduous forest, riparian or river edge forest and boreal forest. Open country habitats include savanna, krummholz above the tree-line, deserts, cliff sides and coral atolls; within these habitats they may be arboreal, or partially or totally terrestrial.

Tropical rain forests are home to the greatest number of pigeon species. Among the totally arboreal rain forest forms are various members of the genus *Columba* found both in the New and Old Worlds. Australasia is also home to the totally frugivorous *Ptilinopus* fruit-doves and *Ducula* imperial-pigeons. The *Treron* green-pigeons are also fruit-eaters, and can be found in the tropical forests of Africa and Asia. The frugivorous New Zealand Pigeon is the only native pigeon found in New Zealand today. All the above forms forage mostly by plucking fruit directly off trees.

Some pigeons of the forest interior nest and roost in trees but are mainly ground-living. The Tambourine Dove of Africa and *Chalcophaps* doves of southern Asia and Australasia fall into this category. Some ground-living forest species have evolved into partridge-like forms with rounded wings and long legs

adapted for their terrestrial mode of life. These include the Old World *Gallicolumba* ground doves and the New World quail-doves (*Geotrygon*). *Gallicolumba* species are found mainly from the Philippines and Sulawesi to New Guinea, while several species occur on the islands of the South Pacific. Some *Geotrygon* species have colonized islands in the Caribbean including one form endemic to Jamaica, the Crested Quail-dove.

One of the most gamebird-like pigeons is the forest-living Pheasant Pigeon of New Guinea, which both resembles a pheasant in aspect and behaves like one. The three crowned-pigeons of New Guinea are also very galliform-like and completely terrestrial in their foraging behaviour.

The Asian and Australasian cuckoo-doves (*Macropygia*) are also forest-dwellers. However, they tend to feed in the understorey or at the forest edge. They are very agile and sometimes hang upside-down like fruit-doves. They are found in a variety of forests: for example, the Ruddy Cuckoo-dove (*Macropygia emiliana*) occurs in lowland savannas but is commoner in hill forests; the Barred Cuckoo-dove (*Macropygia unchall*) is a denizen of submontane forest, but may range up to 3000 m.

Size differences in pigeons, notably fruit-eaters, often reflect dietary preferences and may permit resource partitioning in two ways: first, larger pigeons eat larger fruit and probably ignore smaller fruit, as not being energetically worthwhile; and second, smaller pigeons may perch on thinner branches, giving them access to fruit that is not accessible to larger, heavier birds. For example, 18 species of fruit pigeon live in New Guinea, with as many as eight species thriving sympatrically in one lowland rain forest. These species form a graded size-series: the diminutive 49 g Dwarf Fruit-dove and 76 g Beautiful Fruit-dove (*Ptilinopus pulchellus*) feed on fruit of 7 mm in diameter; the 123 g Superb Fruit-dove (*Ptilinopus superbus*) and 163 g Ornate Fruit-dove (*Ptilinopus ornatus*) take 7-20 mm fruit; the 245 g Pink-spotted Fruit-dove and 414 g Purple-tailed Imperial-pigeon (*Ducula rufigaster*) harvest fruit ranging from 20 to 30 mm in diameter; and the 592 g Zoe's Imperial-pigeon and 802 g Pinon's Imperial-pigeon (*Ducula pinon*) consume fruit that is 30-40 mm in diameter. Thus, in some cases competition is reduced when there is no size overlap in preferred food items, and where overlap occurs competition is avoided by smaller individuals foraging from thinner twigs than their competitors.

Closely related similar-sized species often replace each other in specific habitats. For example, the 176 g Short-billed Pigeon (*Columba nigrirostris*) is a denizen of humid lowland forests of southern Mexico and Central America, including parts of Panama; the closely related 180 g Ruddy Pigeon (*Columba subvinacea*) replaces it at higher altitudes, although there is some overlap in their altitudinal ranges. The 76 g Beautiful Fruit-dove occupies areas of high rainfall in New Guinea, and is replaced in areas of low rainfall by the 75 g Coronated Fruit-dove (*Ptilinopus coronulatus*). The lowland 592 g Zoe's Imperial-pigeon is replaced by the 613 g Shining Imperial-pigeon (*Ducula chalconota*) at high elevations.

Different forms of savanna are occupied, though all can essentially be defined as grassland with scattered trees, the density of trees varying from place to place. In Australia, such open woodland is home to Crested Pigeons, as well as Peaceful and Bar-shouldered Doves. The American Mourning Dove is a common species in similar habitat, while the African Mourning Dove (*Streptopelia decipiens*) and the Namaqua Dove are typical inhabitants of African savannas.

Some species breed in great colonies in mangroves. These include the White-crowned Pigeon (*Columba leucocephala*) of the Caribbean, and the Torresian Imperial-pigeon of Australia. The Bare-eyed Pigeon (*Columba corensis*) is primarily an occupant of arid habitats on Curaçao and Bonaire, but it too frequents mangroves. The Cinnamon-headed Green-pigeon (*Treron fulvicollis*) of Malaysia and the Greater Sunda lives in mangroves as well as swamp forest, open scrub and coastal forest.

Cliff-dwelling is mostly restricted to the Old World forms, the most famous case being the widely distributed Rock Dove. This species occurs naturally on rock faces, notably at coastal sites, such as on islands off the north and west coasts of Scotland and in the Mediterranean, but it also occupies similar rocky habitat deep inland in various parts of Eurasia. The Snow and Hill Pigeons also inhabit rocky zones. Rock Doves and Hill Pigeons occur sympatrically in some areas, and they occasionally hybridize. The Speckled Pigeon also nests on cliffs at various inland sites in Africa. The Bare-faced Ground-dove (*Metriopelia ceciliae*) of the Andes roosts and nests on sheltered rock ledges, although it also nests occasionally in holes in buildings or on the ground.

Unique among pigeons are some Australian species that are totally terrestrial, such as the rock- and cliff-dwelling Chestnut-quilled (*Petrophassa rufipennis*) and White-quilled Rock-pigeons (*Petrophassa albiguttata*), as well as the Flock Bronzewing (*Phaps histrionica*), and the Spinifex Pigeon. It is interesting to note that Australia has few Galliformes: three megapodes and three *Coturnix* quails. Absent are the pheasants, partridges and allied groups of other regions, with the result that several of Australia's pigeons seem to occupy these "empty niches". The Spinifex Pigeon appears to behave like a Chukar (*Alectoris chukar*), and the Squatter Pigeon (*Geophaps scripta*), and Partridge Pigeon (*Geophaps smithii*) like the "typical" partridges (*Perdix*).

The Atoll Fruit-dove, unlike other members of its genus, does not inhabit forest, but instead occupies barren atolls where it forages on the sand or coral. The Clarion Island race *clarionensis* of the American Mourning Dove lives on an almost treeless island, where its habitat consists essentially of grassland with scattered shrubs, though it is found throughout the island, even down to the beach, where it may forage by the water's edge. One pair was found nesting in an old shipwreck alongside the crashing surf!

Pigeons may survive some of the harshest habitat in the world. For example, the Snow Pigeon may occur above the tree-line in the Himalayas, while the Golden-spotted Ground-dove (*Metriopelia cymara*) is found at 3000-5000 m in the high Andes; American Mourning Doves thrive in the deserts of California and may breed when air temperatures reach 44°C; and Common Bronzewings (*Phaps chalcoptera*) may survive in the harsh sandy or stony deserts of Australia.

In summary, pigeons have invaded a wide variety of habitat types, including open and closed forest land, hot and cold environments, highlands and lowlands, deserts, cliffs and littoral zones. This variety shows them to be one of the most adaptable bird groups of all.

General Habits

Doves vary from being totally asocial at one extreme to regularly flocking and markedly social at the other. In between these

Most pigeon species of open areas are markedly social, and the Flock Bronzewing lives up to its common name by being one of the most gregarious of all. Before much of its tussocky grassland habitat in Australia was destroyed by introduced sheep and rabbits it was reported as occurring in "countless myriads" and flocks of hundreds of thousands were still seen in the 1930's, but maximum numbers today are in the thousands. The species is now commoner in cattle-ranching areas, since the vegetation there is less closely cropped.

[*Phaps histrionica*,
Barkly Tableland,
Northern Territory,
Australia.
Photo: Roger Brown/
Auscape]





Among the most unusual habitats for a pigeon are the snowy heights of the great mountain ranges of Central and southern Asia. These are the home of the Snow Pigeon, a close relative of the Rock Dove (*Columba livia*) that breeds at up to 5000 m in the Himalayas and Pamirs. The species is absent only from the cold, arid valleys of the Tibetan plateau. It nests, often colonially, in rock crevices, occasionally on ledges, in inaccessible places, and descends in winter to around 1500 m to forage in flocks on grass slopes and in cultivated fields.

[*Columba leuconota leuconota*, Nepal.
Photo: Masahiro Iijima/
Ardea]

extremes are species that flock at certain times or seasons. The Grey-chested Dove (*Leptotila cassini*), White-tipped Dove (*Leptotila verreauxi*) and Ruddy Quail-dove are usually encountered alone or in pairs foraging on the forest floor. These species never form flocks; in fact, the Ruddy Quail-dove is usually encountered as singles even in the breeding season. At the other extreme is the Flock Bronzewing of Australia, of which solitary birds are only rarely encountered. This species flies in closely packed flocks, sometimes containing several hundred birds, and after a good breeding season flocks may contain several thousand individuals.

Whether doves nest colonially or in scattered pairs, one finds that most are social to some degree. For example, Rock Doves in eastern Morocco inhabit rocky hills and nest in loose colonies that sometimes number up to 1000 birds. Each morning large flocks leave their cliff homes to forage on the plains below or to visit water-holes sometimes 20 km from their nesting sites. In Costa Rica, some species may form mixed groups, for example Inca Doves often flock with Common and Ruddy Ground-doves (*Columbina talpacoti*). In contrast to these species, the related Plain-breasted Ground-dove (*Columbina minuta*) is only rarely seen in groups.

Some species form large flocks only after the breeding season and during migration: these include American Mourning Doves and Band-tailed, Picazuro (*Columba picazuro*) and Spot-winged Pigeons (*Columba maculosa*). Perhaps the most spectacular flocks ever encountered historically were those of the extinct Passenger Pigeon. One migrating flock encountered in 1740 in Pennsylvania extended 3-4 miles (about 5-6 km) in length and more than a mile (about 1.5 km) in breadth. They flew so closely together that they obscured the sun. Although such spectacles have sadly passed into history, the migration of Eared Doves in the north-east of Brazil ranks among the most spectacular of bird mass migrations today: at intervals of 2-3 years, compact flocks of thousands appear to feed on *Croton* seeds.

Birds in a flock are obviously competing with each other for resources, so dominant individuals will outcompete subordinates. What is the advantage then for subordinates to continue flocking? The main benefit is that members of a flock act as extra pairs of eyes warning the other members of danger, thus reduc-

ing their chances of being preyed upon. Time spent by each individual in being vigilant is reduced as the extra pairs of eyes increase, which permits each bird to spend its time more profitably in drinking or eating. This has been quantified for White-tipped Doves and Common Ground-doves at a water-hole in Costa Rica: single White-tipped Doves would sip water for bouts lasting 1.4 seconds, each member of a group of five would sip for 4.2 seconds, and each in a group of eight or more doves sipped for 7.9 seconds at a time; Common Ground-doves never drank alone, but members of a pair would sip for 1.3 seconds, members of a group of five for 4.3 seconds, and those in flocks of eight or more for 8.4 seconds. The individual thus appears to feel safer as flock size increases.

Prairie Falcons (*Falco mexicanus*) wintering at Lawrence, Kansas, in the midwestern USA, will sometimes fly at rooftop level and surprise and take single feral pigeons as they round corners; they will also stoop and take solitary birds. A basking flock, however, is never taken by surprise, as some individuals are bound to spot the falcon from a long way off; the pigeons burst into the flight, with a clatter of wings, rapidly attaining speeds up to 60 km per hour, dodging to left and right in close-order drill manoeuvres.

Flocks may also act as information centres, attracting other individuals to good food sources. It is on record that Passenger Pigeons flew in circles and made a special sound to call in their comrades to newly discovered mast crops.

An alarmed pigeon may spread its tail and spread and raise one or both wings almost vertically above its back. This posture is also used as a threat display, and may be seen in between bouts of fighting. Pigeons fight by buffeting each other with their wings as well as pecking. The Tooth-billed Pigeon has a cornified lump of skin at the bend of its wing which it uses as a weapon during bouts of buffeting; it is reminiscent of similar weapons found on the wings of the highly territorial flightless steamerducks (*Tachyeres*). Wing-raising and wing-buffeting are manifested in nestlings, and have been observed in seven-day-old Tambourine Doves. Adults respond to predators or potential predators approaching too close to their nest by feigning a broken wing and trying to lead the intruder away from the nest; this has been described for various species including the Namaqua, American Mourning and Galapagos Doves.

It is noticeable that pigeons will often adapt to ecological niches usually occupied elsewhere by species from different avian orders, and as a result terrestrial Columbidae of open, dry country can come to look like partridges (Perdicipinae) or New World quails (Odontophoridae).

In the case of the Pheasant Pigeon, with its horizontal stance, long legs and substantial tail, the resemblance is to the pheasants (Phasianinae) of South-east Asian forests, there being no pheasants native to its New Guinea home. The species not only looks like a pheasant but also pursues the same secretive lifestyle in upland rain forest and monsoon forest, feeding mostly on fallen fruit and seeds in the undergrowth. With a display and mode of locomotion that also resemble those of pheasants, it is no real surprise that this bird's relationship to other pigeons is rather unclear, and that it is usually placed in a subfamily of its own, Otidiphabinae, the scientific name for its genus actually suggesting a bustard-like appearance!

[*Otidiphaps nobilis*.
Photo: Günter Ziesler]



When they are not engaged in foraging, territorial fighting, fleeing from enemies or courting, doves occupy much of their "leisure" time in feather maintenance. These activities include preening, rain-bathing, water-bathing, sun-bathing and, in some cases, dust-bathing. These activities keep the surface of the feathers in good working condition allowing them to serve their important roles in flight, thermoregulation and courtship signalling.

Preening behaviour involves use of the bill to remove foreign bodies, such as parasites and pieces of flaked feathers, from the plumage, as well as passing the contour and flight-feathers through the bill, and in so doing re-hooking all the barbels that have come loose. The uropygial, or preen, gland situated at the base of the uppertail is present in some, but not all, pigeon species. Curiously, those that possess one do not seem to utilize it in feather maintenance, as occurs in other birds. Along with herons, parrots, and a few other groups, pigeons have powder-downs which appear to be used in feather maintenance in place of the waxes produced by the uropygial gland.

Ectoparasites living in pigeon feathers are not only harmful to their hosts' health but may affect their desirability as mates. The feather lice *Columbicola columbae* and *Campanulotes bidentatus* feed on feather barbules of the Rock Dove. In an experiment, a specially constructed device placed on the bills of Rock Doves constrained them from preening but did not prevent them from eating. The feathers from the constrained pigeons weighed more than those of controls (unconstrained birds) due to heavier louse loads, and the feathers of restrained birds were perceptibly poorer in quality due to damage by these lice. This experiment thus clearly demonstrated the importance of preening in the control of feather parasites. Also, females paired more often with controls than they did with experimentally restrained males in choice experiments, demonstrating that females could somehow detect which males were heavily parasitized and thus of impaired fitness.

The head and bill are cleaned by bringing one foot forward under the wing and scratching the target areas. Allopreening by mated pairs or by young and adult also serves this function. Foreign bodies in the eye may be removed by rubbing the eye against the shoulder or by repeated blinking of the nictitating membrane.

Rain-bathing too plays an important role in feather maintenance. Pigeons generally assume a very distinctive posture in

response to rain: the bird crouches against the substrate, then tilts its body to one side, with the wing on that side slightly folded and tucked under the body; the other wing is then spread and raised over the back to expose the feathers of the underside of the wing, and the feathers and apteria of the flanks and sides; the tail is spread, and all the feathers, notably those of the rump, are erected, enabling rainwater to pass onto the skin surface. A bird will lie in this position for a few minutes, and then change sides. In response to a light drizzle doves will rain-bathe for 15-30 minutes at a time. Terrestrial species, such as the Galapagos Dove, the Common Bronzewing, the New World quail-doves (*Geotrygon*) and the Luzon Bleeding-heart (*Gallicolumba luzonica*), will rain-bathe while crouching on the ground, whereas arboreal species, such as fruit-doves and fruit-pigeons (*Treron*, *Ptilinopus*, *Ducula*) and *Columba* species rain-bathe on exposed tree branches. Although the Crested Pigeon spends much time on the ground, it too seeks the highest branch in the vicinity as a site for rain-bathing. A captive Nicobar Pigeon, another predominantly ground-living species, was once observed assuming a rain-bathing "Wing-up Posture" in response to a sprinkler, while sitting on a branch.

The threshold releasing the rain-bathing posture varies from species to species. Galapagos Doves apparently have the lowest threshold of response. Captives sprayed with a watering can will gather collectively in an area to rain-bathe. One observer had a planter hanging off a patio which was above his aviary. Whenever he watered his plants excess water would drip into the aviary and all the Galapagos Doves which happened to be sitting below would assume the rain-bathing posture. Incredibly, even individuals not in the immediate vicinity which heard the dripping water would assume this posture! In our home, tame Black-backed Fruit-doves would run back and forth along their perch and assume a full rain-bathing posture whenever they heard a vacuum cleaner turned on! These two observations indicate that moisture is not the only releaser of the rain-bathing behaviour, but certain sounds alone are enough to trigger this response in some species.

The tiny Diamond Dove does not normally show the typical rain-bathing posture, but a bird subjected to a fine spray of water may raise one wing up just for a few seconds, suggesting that the instinct is still present in a vestigial form. Populations living in coastal parts of the Kimberleys in north-western Australia usu-



The New Zealand Pigeon is the only columbid native to its namesake islands. When humans arrived there, much of the original forest was cleared and the species suffered a substantial decline. However, it proved itself able to adapt to introduced exotic vegetation, and today it feeds and nests on willow, poplar and fruit trees, sometimes in gardens. It feeds on a high proportion of foliage and flowers, in addition to the more usual fruits, and this could be a contributing factor to its extremely long incubation and fledging periods.

[*Hemiphaga novaeseelandiae*
novaeseelandiae,
South Island,
New Zealand.
Photo: Darran Leal/
Auscape]

The effectiveness of cryptic coloration is of paramount importance to terrestrial birds inhabiting open landscapes with little cover. The dull greyish brown plumage of the Bare-faced Ground-dove is excellent camouflage among the lichen-covered rocks of dry, stony puna country in the Andes. The species also occurs at lower altitudes, even in cities, foraging on the ground for seeds. The genus *Metriopelia*, found only in South America, possibly descends from a Columbina-like ancestor that adapted to high altitudes.

[*Metriopelia ceciliae*,
Colca Valley, Peru.
Photo: Patricio Robles Gil/
Sierra Madre]



ally leave for the dry interior before the onset of the rainy season. It has been suggested that because of its very small size a Diamond Dove exposed to rain would very quickly be soaked through, curtailing its ability to fly and escape from enemies.

Regular bathing in puddles of water by Rock Doves was described in detail by O. and M. Heinroth, and the process is similar in all pigeons that bathe in standing water. A Rock Dove will wade into a puddle of water and make pecking movements at the water's surface, after which water is flicked sideways by means of rapid lateral sweeping movements of the bill. The bird may then assume the rain-bathing posture with one wing up. This is followed by partial immersion of the body and vigorous wingbeats onto the water surface. When fully soaked, the pigeon then shakes its feathers and seeks a site in which to sun-bathe. The duration of bathing bouts seems to vary in proportion to the size of the pigeon, and small species, such as the Common and Ruddy Ground-doves, perform very short bouts. The forest-living quail-doves rarely puddle-bathe, and, if they do so, it is only in bouts of less than 10 minutes. Ruddy Ground-doves exhibit an interesting variation in bathing behaviour: a bird may venture into a puddle until it can no longer touch the bottom; it then raises its tail and paddles with its legs, swimming out to deeper water and then back to dry land, tracing a semi-circle.

Nearly all pigeons are enthusiastic sun-bathers, the sun being important for the synthesis of vitamins. However, the frequency of sun-bathing and the time of day at which it is performed differs with species, and appears to depend on the environment in which each lives. Common Bronzewings, Crested Pigeons, Spinifex Pigeons and Galapagos Doves are avid sun-bathers, and will do so under the full noon sun. Forest-living Quail-doves, on the other hand, avoid the full midday sun and tend to sun-bathe earlier in the morning when the sun is less intense.

The postures assumed in sun-bathing are the same as those seen in rain-bathing. In response to low sunlight levels the pigeon crouches, leaning to one side, with one wing tucked under the body, and after some time the other wing is spread and pointed downwards. The spread wing is raised over the back in response to more intense sunlight. The Galapagos Dove seldom shows the low-intensity posture but almost always the high-intensity Wing-up Posture. In contrast, captive Diamond Doves, sunning themselves while sitting on a bed of pine needles, were never

seen to raise their wings, but another group in the same aviary, sitting under a sheetmetal roof and therefore exposed to a higher temperature, gave the full Wing-up Posture. Thus, different species have different thresholds releasing this behaviour.

Diamond Doves held in aviaries at 30°C, a temperature when other pigeons are comfortable, will show signs of cold stress: the Diamond Doves puff themselves into balls and are listless. However, the same species in the wild in the Kimberleys gave full Wing-up sun-bathing postures in bright sun, when temperatures in the shade were 45°C and when other birds were seeking shade and gaping and thus exhibiting heat stress; the temperature of the sand substrate was 70°C. The adaptation of this species to life in areas of very high temperature is thus clearly illustrated.

The importance of sunshine to the well-being of doves may be appreciated by depriving captives of sun for a few months. Under these conditions their feathers become progressively blacker as melanin is deposited in their feathers, a process which has been documented, for example, in the Namaqua and Galapagos Doves and the Croaking Ground-dove (*Columbina cruziana*). Black feathers will be replaced by normally coloured feathers in the subsequent moult if, in the meantime, the doves are permitted to sun-bathe. A more serious consequence is the appearance of rickets in the nestlings of adults deprived of access to sunshine: a female enjoying long sun-baths in late spring and summer manufactures vitamins which are stored in her body and later transferred to her eggs and hatchlings, but the absence of these vitamins reduces her nestlings' chances of survival.

Dust-bathing or sand-bathing as a means of feather maintenance has been documented in the Bare-faced and Croaking Ground-doves. An individual *Metriopelia* will raise its body feathers and lie in a trough dug with its bill. It then continues to flick sand over its back with sideways sweeping movements of the bill. From time to time it stretches its body full length and rubs its belly against the sandy substrate. Similar, convergent behaviour can be seen in Galliformes.

Voice

Students of bird vocalizations generally distinguish between advertising songs and calls. Advertising songs, by convention, dif-



The long decurved bill of the Galapagos Dove gives it a most distinctive, rather partridge-like appearance. The bill shape and long legs are adaptations to a ground-dwelling existence among the inhospitable volcanic rocks of the Galapagos Islands. The strange impression is reinforced by the bird's foraging behaviour: it scratches and digs in the soil with its bill, using a series of movements very unusual for a dove, and takes seeds that are often too hard for Galapagos finches (*Geospiza*). In the course of this activity it can move soil equivalent to its own volume in five minutes.

[*Zenaida galapagoensis galapagoensis*, Española, Galapagos Islands. Photo: X. Ferrer & A. de Sostoa]

fer from calls in being more elaborate in structure and in functioning in the processes of territoriality, advertising and stimulating a mate. Calls tend to be simpler in structure and of short duration, and they function in contexts such as signalling danger (alarm calls), contact, aggression (threat) or solicitation of feeding. Although exceptions to these rules do occur, this distinction in terms is useful in describing vocal repertoires of doves.

The flute-like coos of doves are the functional equivalent of the territorial song of oscines. This is easily demonstrated, for example, by playing recorded coos of American Mourning Doves to wild individuals. The target bird will often cease singing and fly towards the experimenter. After a period of silence it may engage in accelerated bouts of cooing. The target bird has treated the tape-recorded song as a conspecific intruder encroaching upon his territory.

While conducting field work at Hitoy Cerere, Costa Rica, an investigator heard the soft coos of a dove species that he did not recognize emanating from a tree at the edge of the rain forest. He imitated the call and soon a male Blue Ground-dove (*Claravis pretiosa*) came flying with noisy wings towards him. It veered away when it was within about four metres of his head, realizing at the last moment that he was not a dove. J. Delacour wrote that Pheasant Pigeons will readily respond to imitated territorial coos by cooing and stalking to and fro with the spread tail erect, as if challenging an intruder. Tape-recorded coos that were altered in pitch in different ways were played to Eurasian Collared-doves. By quantifying their responses to the variously altered playback tapes it was possible to decipher the important frequency parameters used by these doves in species recognition.

In addition to its role in studying species specificity, in song, playback of territorial song to doves may be used as an invaluable tool in census work, especially for endangered species. Playback has also been used to demonstrate that juvenile American Mourning Doves may recognize their male parent by characteristics in his individual specific song: the male sings to the nestlings during his nest visitations, and thus enables his progeny to learn the characteristics of his voice.

The advertising role of coos may be demonstrated in caged pairs of American Mourning Doves by counting coos of the males before and after their females are removed: a tenfold increase in cooing has been noted in males bereft of their mates. Cooing rates dropped to previous levels if the females were returned and pair-bonding was restored. Unmated colour-ringed male American Mourning Doves produced a mean of 8.4 coos per minute whereas mated males produced an average of 0.63 coos per minute. Cooing in Band-tailed Pigeons ceases abruptly once incubation begins, indicating that it functions in pair formation and courtship.

The sexual role of dove song has been demonstrated by playing tape-recorded coos to captive African Collared-doves: the ovaries of female doves grew at a faster rate when exposed to tape recordings than in females not exposed to playback. By stimulating females with tape-recorded coos rather than exposure to courting males, it was found that females are responding to conspecific sound alone, independent of visual stimuli produced by the live male.

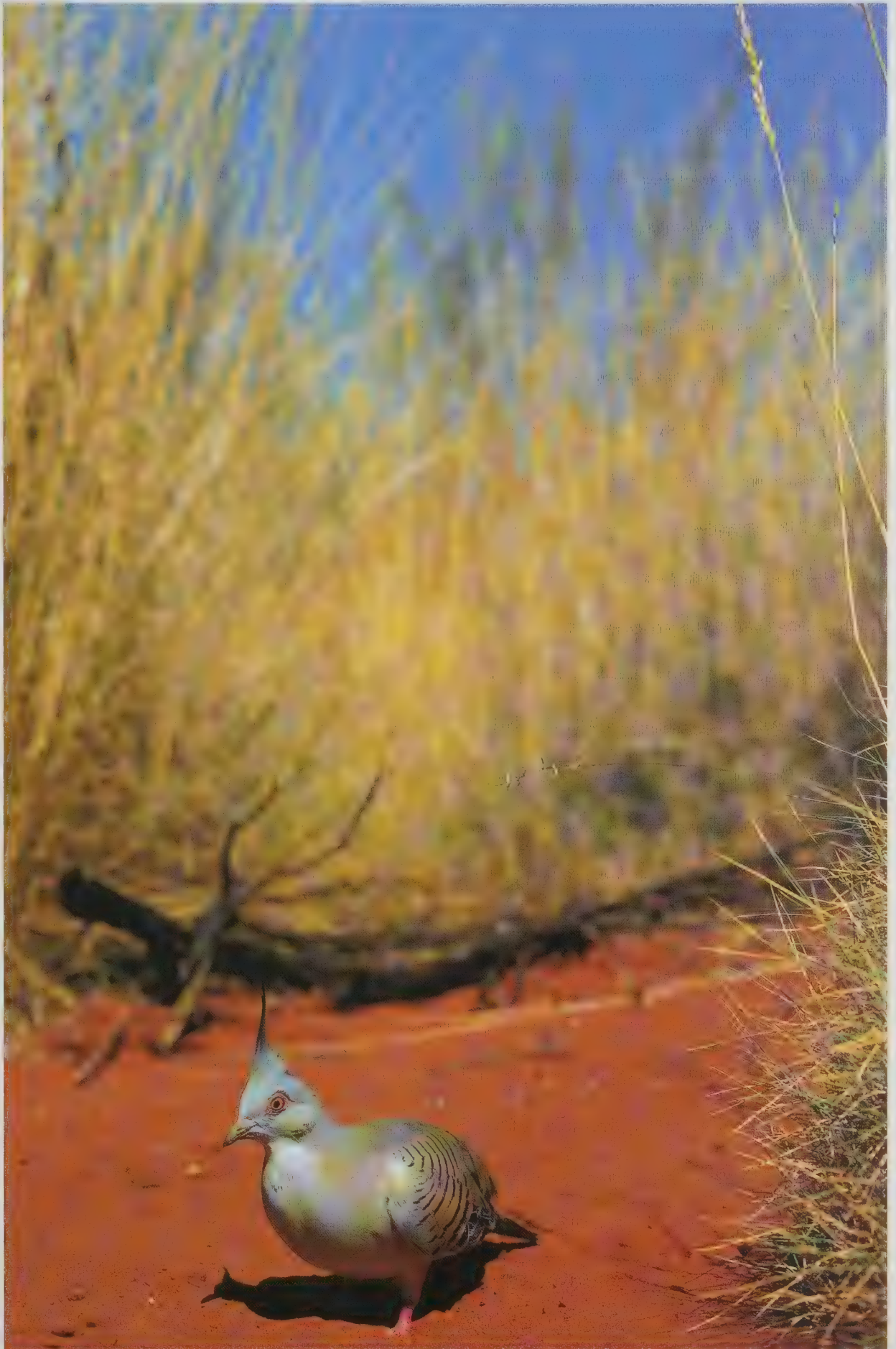
However, the role of playback in stimulating hormone production and ovarian growth is indirect. A male's song stimulates the female to produce nest-calls and it is her own song that stimulates gonadotrophic hormone production in the hypothalamus; experimentally devocalized females did not grow ovaries. On the other hand, devocalized females exposed to playback of their own taped calls did show growth of ovarian follicles. These experiments demonstrate the role of female vocalizations in "self-stimulatory" endocrine changes. Deaf females could still produce nest-calls and these birds showed some endocrine response, indicating that proprioceptive feedback also plays a role in stimulation of hormone production. Detailed studies of the dove brain have revealed nerve connections between the syrinx and the hypothalamus.

The above experiments have demonstrated the functions of coos in territorial and sexual contexts. What of the structure of the coos themselves? Most doves produce flute-like cooing noises immediately recognizable as emanating from a columbid, but not all doves coo.

Pigeons are often able to adapt quickly to man-made changes in habitat. One example is the delightful Crested Pigeon, an Australian endemic which has expanded its range this century thanks to forest and scrub clearance for agriculture, with a corresponding increase in water availability, and abundant food in the form of scattered poultry and pig feed. Open grassland with scattered trees or small woods for nesting and roosting in is an ideal habitat, precisely what sheep- and cattle-raising create. Having become used to man around farmsteads, the species is now common in towns and cities, where it feeds readily on exotic seeds and fruits. The Crested Pigeon, the most arboreal member of the bronzewing complex, is occasionally lumped into the genus *Geophaps*.

[*Ocyphaps lophotes*,
Australia.]

Photo: Roland Seitre/Bios]





The tropical forests on islands of the Indo-Malayan region are by far the part of the world richest in Columbidae species, in particular the arboreal fruit-pigeons of the subfamily Treroninae. Alfred Russel Wallace suggested that the reason for this abundance could be the relative paucity of monkeys, which are both nest-predators and food-competitors. The White-bellied Imperial-pigeon is a typical representative of this frugivorous complex, a surprisingly acrobatic group of pigeons which readily hang upside-down to reach their favourite morsels.

[*Ducula forsteni*,
Sulawesi.
Photo: Brian J. Coates]

Sound spectrograms reveal that the advertising song of the Pheasant Pigeon is a pure-toned whistle descending in pitch, and lasting about 2 seconds; each whistle is separated from the next by intervals of about 8 seconds. This call is remarkably similar to the calls of some tinamous (Tinamidae) and the Crested Wood-partridge (*Rollulus rouloul*). It is now well known that unrelated birds occupying similar niches often produce very similar vocalizations. Selection is often for sounds that carry as far as possible across the environment, that is for minimum attenuation over distance, which probably accounts for the similar calls in this pigeon, this partridge and tinamous.

The advertising coo of the White-bellied Green-pigeon (*Treron sieboldii*) is a series of long, drawn-out, frequency-sustained coos with a few slightly frequency-modulated coos. The call of the congeneric Pink-necked Green-pigeon (*Treron vernans*), on the other hand, is a rather undove-like series of duck-like "waak" calls in descending pitch, followed by a series of chattering notes reminiscent of the calls of some Old World babblers (Timaliidae), or "waak-waak-waak-watcha-watcha-watcha-eh-eh-eh-eh". The song of the Whistling Dove consists of a loud whistle rising in pitch followed by a "falling tinkle", but its close relative the Golden Dove emits sounds reminiscent of a barking dog.

Whereas most members of the New World ground dove genus *Columbina* utter soft coos, the Croaking Ground-dove produces croaks reminiscent of a frog. On one occasion, a captive Croaking Ground-dove in California was witnessed carrying on a duet with a Pacific tree-frog (*Hyla regilla*) which croaked each time the dove cooed. Another unusual song is that of the Bare-eyed Pigeon which produces a song with four notes, "whoop-puk-puk-whoop"; the two "puk" notes are reminiscent of notes from a bongo drum.

Species specificity in bird song may be coded in frequency, complexity, rhythm, duration and tonal quality. How do these parameters vary in dove calls? Frequency or pitch of dove coos, measured in kilohertz, is inversely proportional to the mass of the individual, so smaller doves produce higher-pitched calls and larger doves lower-pitched calls. For example, the tiny 28-43 g Diamond Dove of Australia or the 30 g Common Ground-dove of the New World produce high-pitched calls, whereas the large 2000 g crowned-pigeons of New Guinea produce very low-

pitched booming calls. The 1624 g Nicobar Pigeon of New Guinea and other islands also produces low-pitched coos rather reminiscent of the grunting of a pig!

Within the genus *Zenaida* we find the 190 g Socorro Dove producing lower-pitched calls than the smaller American Mourning (123 g), Eared (114 g) and *Zenaida* Doves (159 g). The relatively small Galapagos Dove, of 88 g, is exceptional in producing a call deeper in tone than all its congeners: conceivably its deep tone may be the product of a modified syrinx, as has been seen to be the case in some other bird species, but it might also be the product of modified neurocircuitry. This exceptional case certainly deserves further study.

Species specificity in dove songs may also be coded by pitch-modulation. Sometimes this modulation may be gradual, as already described for White-bellied Green-pigeons. With the exception of the Galapagos Dove, songs of doves in the genus *Zenaida* commence with a coo that rises in frequency, followed by three or four notes at a lower pitch and sustained in frequency, "Coo-OOO-ooo-ooo-ooo". If the frequency modulation is very rapid, a trilled sound or "CROOO" ensues. New World members of the genus *Columba* have a nest-call that is rapidly pitch-modulated to sound like "CROOO!" The African Collared-dove's song begins with a single "HOOO" followed by a "CROOO" and a "waak" ending. Playback studies with Eurasian Collared-doves indicate that pitch characteristics are important in species recognition.

Pigeons may also recognize conspecifics by various temporal parameters coded in their songs. Species specificity in total duration of song may be illustrated by comparing the nest-calls of Socorro and American Mourning Doves which are 1.92 versus 1.12 seconds in duration and vary little within each species. The songs of the spotwing doves (*Turtur*) are all similar, but the educated ear soon learns to recognize different rhythms in each species' song; the rhythms are provided by intervals of silence between the notes and the duration of each note. Intervals following each song are also species-specific and have been best studied in various *Streptopelia* species. Finally, species differences in song may be coded in tonal quality: for example, the songs of Eared and *Zenaida* Doves are pure-toned and flute-like, whereas those of the Socorro Dove are harsh-sounding due to "noise".

Students of avian vocalizations are also concerned with repertoire size and the function of each sound within the repertoire. Doves in general have songs that are used in three contexts, corresponding with territorial or sexual drives. The "advertising" or "Perch-coo", the "Nest-coo" delivered at the nest or potential nest-site, and the "Bow-coo" when the male is displaying to the female.

The African Collared-dove delivers its "whoop-crooo-waak" in three different contexts: as an advertising or Perch-coo; as a Nest-coo; and as a Bow-coo. The differences in the coo structures as revealed in the sound spectrograms are small. The main difference is in the rate of delivery: Nest-coos are separated by intervals of 2-3 seconds. Perch- and Bow-coos by much shorter intervals of 0-16 seconds. The African Collared-dove's congeners the Eurasian Collared-dove and Red Turtle-dove (*Streptopelia tranquebarica*) have Perch- and Bow-coos that are distinctly different from each other. Tambourine Doves and their congeners have a long Perch-coo that consists of single notes accelerating in tempo, "whoop...whoop...whoop...whoop, whoop, whoop". When directed at a female this song ends with a rapid stuttering trill or "whoop...whoop...whoop, whoop, whoop, wuwuwuwu!" The difference between Perch- and Bow-coos in this species, then, is in the terminal portion, while the Nest-coo is a single soft "whoop" separated by long intervals.

The Rock Dove has a Perch-coo that is a single moaning "oorh" repeated at regular intervals. This same "oorh" is used as a Nest-coo. Its Bow-coo is the elaborate "Oo-roo-coo t' coo wok". The Croaking Ground-dove, in turn, has a repertoire of four different Perch-coos distinct from its Nest-coo, and there are also marked sexual differences in voice, the female's calls sounding like a bleating lamb.

Fruit-doves in the genus *Ptilinopus* often have two distinct Perch-coos. The Black-backed Fruit-dove has a Perch-coo that is a series of short and long coos, "wuHoo!wuHoo!wuHoo!" It also has a second advertising coo that is a single "whoop" repeated at intervals. The "whoop" song is delivered with a bowing movement even in the absence of the female. This sotto voce

Bow-coo is also performed by its close relative the Pink-headed Fruit-dove.

The White-eared Brown-dove has at least three different advertising calls. The most commonly heard is a coo series that rises in frequency and increased in tempo or "cooo, cooo, cooo, coocoocoocooco"; this version is also used in its nest display. A second call is a trill delivered at a more rapid tempo than the first and that falls in pitch, "du, du, du, dududududu!" The third call is more rarely heard and consists of a series of low-pitched guttural notes, beginning on an even tempo and then accelerating in tempo, "wa-roo, wa-roo, wa-roo, wa-roo, wa-roo, roo, rororororo!"

In summary, doves differ both in repertoire size and in the contexts in which coos are utilized. At one extreme is the African Collared-dove, wherein a similar coo is used in all contexts, and at the other extreme is the Croaking Ground-dove with four advertising calls distinct from its nest-call.

Although songs are generally associated with male doves, many or possibly all female doves also sing, and some just as frequently as the male. For example, male and female African Collared-doves will Nest-coo reciprocally. The male's coo thus sustains the female's cooing which in turn stimulates production of pituitary hormones that stimulate ovulation.

At Madang, in eastern central New Guinea, a male and female Orange-bellied Fruit-dove (*Ptilinopus iozonus*) were recorded alternating in delivery of advertising calls; females of this species probably aid the male in defence of their territory. Females of White-eared Brown-doves, Black-backed, Pink-headed and Black-naped Fruit-doves (*Ptilinopus melanospila*) call as much as their males, but female Scaly-naped Pigeons (*Columba squamosa*), Rock, Socorro and American Mourning Doves appear to call less frequently than males. Spectrograms of female songs indicate that they are often higher-pitched than the males' songs.

Geographical variation in dove calls is known for only a few species. The Socorro Island subspecies of the Common Ground-dove utters a disyllabic "per-hoo" whereas mainland Mexican

The Chestnut-quilled Rock-pigeon is endemic to the western escarpments of Arnhem Land in northern Australia. It is confined to areas near permanent water and is rarely seen more than about 100 m from the bare sandstone. The eroded gorges and cliffs supply nesting crevices and ledges, as well as shade in the intense midday heat, although birds will also scrape out resting holes under rocks. There is sparse woodland at the base of the escarpment, where birds occasionally feed, but they never perch in trees. They are active mainly in the early morning and late afternoon.

[*Petrophassa rufipennis*, Kakadu National Park, Northern Territory, Australia.

Photo: Claus C. Nielsen]





Sunning is frequent in almost all pigeons. The White-faced Quail-dove seen here would seem to be indulging in the high-intensity sun-bathing posture, in which both wings and the tail are fully spread. More usual is the low-intensity posture, where the bird lies on one side with one wing and the tail on the same side partly spread, a posture very like that adopted in rain-bathing. Sunlight, particularly its ultra-violet component, is vital for the synthesis of certain important chemicals, such as vitamin D, crucial in females for the development of healthy nestlings.

[*Geotrygon albigacies*, Chiapas, Mexico. Photo: Patricio Robles Gil/Sierra Madre]

populations mainly produce a monosyllabic "whuu". In New Guinea, one advertising call of the Orange-bellied Fruit-doves at Madang consists of single notes rising in pitch, descending, then rising again, "HOOooOOO! HOOooOOO! HOOooOOO!", but the same species at Port Moresby produces a more complex "hooWHOOoo WHOOhoo!" Geographical variation is also known in songs of other fruit-doves, for example in the Purple-capped Fruit-dove (*Ptilinopus porphyraceus*) of the Pacific, the Beautiful Fruit-dove of New Guinea and the Claret-breasted Fruit-dove (*Ptilinopus viridis*) of New Guinea. Advertising songs of the Ruddy Pigeon from Chiriquí Province in western Panama differ in rhythm and complexity from those recorded in Darien.

Cross-fostering studies indicate that dove vocalizations develop independent of learning experience. For example, a male Spotted Dove hatched and raised by African Collared-doves will give all the sounds of its species once it is old enough, and shows no evidence of learning from its foster parents. Studies of vocalizations of hybrids also demonstrate inheritance of voice in pigeons. Hybrids between two closely related species will often produce vocalizations reminiscent of one of the parents: thus, a hybrid between a Tambourine Dove and a Namaqua Dove produces vocalization similar to its Tambourine Dove male parent. Hybrids between two unrelated species will produce calls unlike those of either parent: a hybrid between a Socorro Dove with its "coo-OO-ooo-ooo-ooo-OOO" call and an African Collared-dove with its "coo-croo-waak" call, utters a single "OOOHR", quite unlike the songs of both parents. Thus, the more distantly related the parental types, the more disruption of genomes occurs in a hybrid.

Unlike songbirds, doves do not require audiosensory feedback to modify motor output, so the dove brain does not have to monitor or "hear" vocalizations produced and "instruct" the vocal cords to produce the correct sounds. A deaf sparrow sings a very abnormal song because the brain eventually forgets what the correct song sounded like and fails to direct the syrinx in producing the vocalizations, but a deaf African Collared-dove produces completely normal vocalizations, which ties in with the evidence that dove vocalizations are innate and develop independent of learning.

The innate nature of dove sounds permits taxonomists to use them as additional character states when studying taxonomic

problems, as in the case of the Socorro and American Mourning Doves (see Systematics). Vocalizations were also one of the characters used to separate the Zebra, Peaceful and Barred Doves as three distinct species. The severely threatened Grenada Dove (*Leptotila wellsi*) has been classified as a member of a superspecies complex including the Grey-fronted Dove (*Leptotila rufaxilla*), or alternatively as a race of the latter. Again differences in song augmented morphological, ecological and behavioural differences in supporting the separation of these two taxa as two full species. Grenada Doves did not respond to playback of Grey-fronted Dove song, but sang in response to playback of conspecific song. Songs may also be useful in studying relationships of doves at the generic level, for example in the cases of *Oena* and *Turtur*, Old World and New World *Columba*, and *Scardafella* and *Columbina* (see Systematics).

As well as the advertising song, doves have an additional repertoire of calls, usually of shorter duration and simpler in structure than the song. Gregarious ground-living Australian species use very soft single notes to maintain contact. This is most often heard from Partridge and Squatter Pigeons and sometimes from Flock Bronzings. Pairs of Diamond Doves use a growl and Peaceful Doves a low-pitched rattle. African Lemon-doves produce a quiet squeak at intervals of three or four seconds. Many species of dove, such as the Pheasant Pigeon, maintain contact by means of their advertising song. Similarly, one observer noted an Orange-bellied Fruit-dove give a loud advertising call, upon which a female flew towards him. A mated pair of pigeons, reunited after a period of separation, will often produce a greeting call: in the Pheasant Pigeon this is a low-pitched "ru"; in the American Mourning Dove, an "ork"; in the White-eared Brown-dove, an oboe-like "waaa"; and in the Black-backed Fruit-dove, a quiet "whoo".

A dove warning others of a dangerous situation, for instance the sighting of a flying raptor, often holds its body upright and produces an alarm call. This has been described as "oorhh" or "eerh" in the Rock Dove and "cut" in the Inca Dove. The warning call of the Black-naped Fruit-dove is a low-pitched stuttering trill, "do do do do do!" A female American Mourning Dove chased from its nest will signal its distress by uttering a disyllabic "roooo-oo".

Doves often produce aggressive calls when fighting: Orange-bellied Fruit-doves uttered a deep "rooooo" when displacing each other at a fruiting fig tree; an African Lemon-dove produced a

These two *Spinifex* Pigeons are engaged in *allopreening*, an activity probably universal among the *Columbidae*. It takes place only between potential or actual mates, one partner nibbling at the plumage of the other, caressing the skin and removing tiny objects such as parasites, fragments of feathers and dead skin. It generally takes place at the nest-site, especially before or after copulation, and clearly combines a social function (reinforcement of the pair-bond) with practical plumage maintenance. The preener also benefits since the activity is mutual.

[*Geophaps plumifera leucogaster*, Australia.
Photo: Gerry Ellis/
BBC Natural History Unit]



hissing "sissu" call when attacking another individual; and the Common Ground-dove utters a "wut-wut" when threatening another bird.

Streptopelia species often give an excitement call when in some state of arousal. In the African Collared-dove it is a "wu-wu-wu-wu-wu!", but in the Laughing Dove it is a bleat. This call is often used as a greeting call or even as a threat note.

Young pigeons beg for food with a high-pitched squealing sound, but this is soon replaced by low-pitched coos in a curious phenomenon known as the breaking of the voice or *Stimmbruch*, a process that has been shown to be controlled by hormones. This has been best studied in fledgling domestic pigeons which, at about 48-58 days old, produce deep 250 Hz coos alternating with high-pitched 3000 Hz "whee" begging calls. Alternating call types may be produced over a period of six days, after which the "whee" call disappears from the birds' repertoire. However, adult females have been known to use this call to solicit copulation.

Doves are generally "close-contact" species, and mated pairs or adults and young may sometimes sit side-by-side with their bodies touching each other. Tame Tambourine Doves, African Collared-doves, Black-backed and Pink-headed Fruit-doves that were hand-raised often sat on the owner's shoulder, then sidled up, so that their bodies were touching his neck, and then uttered soft "purring" sounds reminiscent of a cat: this sound was only audible to the person when the bird was actually right next to his ear. However, in the White-eared Brown-dove such purring may be heard from a distance of 0.3 m, and it is accompanied by wing-quivering. This purring sound probably serves as a bonding mechanism between adults and young or between mated pairs.

Food and Feeding

Pigeons may be divided into granivorous and frugivorous species, in other words those that eat seeds and those that eat fruit. Many species will also take some invertebrates, such as insects, worms and small snails, and the forest-living *Gallicolumba* of the Old World and the quail-doves of the New World appear to take more invertebrates in their diet than most pigeons, collecting them from the forest floor. A particularly interesting case is that of the Atoll Fruit-dove, which lives on treeless atolls and

has become specialized on a diet of insects and lizards. Females of Orange, Golden and Whistling Doves in Fiji are known to take insects, and a male Black-naped Fruit-dove was seen to catch a small flying moth and swallow it. C. Whitman raised Passenger Pigeons and observed them searching for earthworms, then seizing them and removing them from their burrows with a very rapid, stereotyped movement. Snails are eaten by a number of species, including Ruddy Ground-doves, White-crowned Pigeons and, in the past, Passenger Pigeons.

Seeds are usually taken from the ground and are swallowed whole. Ruddy Quail-doves may visit manakin (Pipridae) leks or go beneath fruiting trees, searching for seeds regurgitated by other birds. Some doves also search for food by "bill-sweeping", a rapid sideways movement of the bill to sweep aside leaves, twigs, soil or other objects in order to expose seeds or small invertebrates.

The Galapagos Dove is unique in that it has a long decurved bill somewhat reminiscent of that of a Himalayan Monal (*Lophophorus impejanus*), which it uses to dig into the soil for various seeds. One individual was observed digging for over 700 seconds. It was estimated that one such dove may remove its own volume of soil within 300 seconds. The main seeds encountered in digging bouts are those of *Merremia aegyptica*, *Ipomoea linearifolia* and *Opuntia echios*: all three plants produce hard seeds, with the result that the resident granivorous Galapagos finches (*Geospiza*) ignore the first two and smaller individual finches have trouble cracking the third species. The first two seeds are readily ingested by the doves, however, although, despite the low diversity of seeds in general in the dry season, the doves appear to exercise some diet choice in that *Merremia* seeds are often either ignored or tested and rejected, apparently when too hard.

Those species that feed on fruit or mast pluck food items directly from the trees. Common Woodpigeons and green-pigeons seize a fruit or nut with the bill and remove it from the stem with a twisting movement of the head. Arboreal feeders have developed the ability to cling to, hang from or clamber among branches. These doves also have large distensible gapes enabling them to take large food items whole.

Doves may exhibit dietary shifts during different parts of the year. Common Woodpigeons supplement their diet with leaves,

buds and flowers when cereal grains and mast are in short supply. White-crowned Pigeons feed on flowers of the mangrove *Avicennia graminans* early in their breeding season, and these flowers have been found to be more energy-rich than fruits of figs (*Ficus*) available at that time of the year. Fruits of *Metopium toxifexum* became the dominant item in the diet later on in the year. In the case of the Galapagos Dove, during the first part of the wet season, from late January to mid-February, birds feed mainly on caterpillars and flowers of a prickly pear cactus, *Opuntia helleri*; from mid-February to early April most foraging takes place on the ground and food consists mainly of *Croton* seeds; from mid-April to May food taken from the ground is supplemented with a variety of seeds and fruit taken from the plants themselves; and during the dry season, foraging is on the ground again.

Granivorous pigeons may be distinguished from frugivorous forms by distinct specializations in the gizzard, intestines and oesophagus adapting them to their particular diets. In seed-eating pigeons like the Rock Dove, the gizzard (the muscular portion of the stomach) has thick muscle walls, whereas in fruit-eating pigeons, such as *Alectroenas*, *Hemiphaga*, *Ducula*, *Ptilinopus* and *Drepanoptila*, these walls are thin. In both groups, the gizzard possesses two pairs of muscle groups which act antagonistically to grind food items stored in the lumen, and seed-eating forms usually store grit in the gizzard to assist in the grinding of seeds. The Nicobar Pigeon, which grinds nutmeg seeds as part of its diet, keeps large quartz crystals in its gizzard, some as much as 10 mm in diameter; its gizzard is armed with horny plates enabling it to crush seeds which would require a hammer for a human to break.

Ptilinopus fruit-doves swallow fruits whole. In this group, the gizzard walls are endowed with hard ridges, nodules and raised processes, which rub the fleshy pulp and skin off the fruit; the undigested stones pass into the intestine and are later expelled whole. The imperial-pigeons prefer fruit with large kernels and therefore have gizzards with a larger lumen.

Green-pigeons and brown fruit-doves (*Phapitreron*) take seeds of grasses and weeds in addition to fruit. These species have a muscular gizzard which is lined with thorny projections, the rugae ventriculares dentatae, which "scrape" the flesh away from the fruit stone by alternating expansion and contraction of

the antagonistic muscle pairs; grit is stored in the gizzard as an aid for crushing seed items.

Fruit-eating pigeons have shortened intestines whereas those of the seed-eating species are much longer, another feature of the grinding system. In addition, *Treron* and the exclusively fruit-eating forms are endowed with special arrangements of muscles and connective tissue, which amplify and facilitate the ability of the oesophageal walls to stretch, and thus increase the diameter of the oesophagus considerably to allow the passage of large fruits.

Doves need water to moisten and help digest their food, and also to prepare crop-milk prior to hatching of their young. Water is also important in regulating body temperature in hot climates by evaporative water loss through the mouth or skin. Most bird species drink by "scooping": the bill is placed into the water, and the liquid taken into the buccal cavity; the head is then raised with the bill pointed skywards allowing water in the mouth to run down the oesophagus by force of gravity. This method of drinking is employed by only one columbid, the Tooth-billed Pigeon. All other pigeons drink by immersing the bill in the water, sometimes up to eye level, and then "sucking" the water up by a pumping action. This method of drinking is unique to columbids and some Australian estrildid finches.

It has been repeatedly stated in the literature that sucking is more efficient than scooping as it takes a shorter time to suck, thus rendering a drinking individual in an exposed situation vulnerable to predators for a shorter period. However, no significant differences in duration were found when drinking bouts of sucking versus scooping estrildid species were compared. A more likely explanation for the selective advantage of sucking is that it enables the individual dove to utilize water from many more sources than can the species that scoop. For example, very shallow puddles or small quantities of water collected on leaves or in small cavities, or in cracks between layered leaves of bromeliads or other plants may be consumed only with difficulty or not at all by scooping. A pigeon will have no problem sucking up such small amounts of water.

Some pigeons, like American Mourning Doves, may fly long distances to obtain water, while others, such as Spinifex Pigeons, do not stray far from water sources. Pigeons usually drink just after sunrise or before sunset, but Crested and Spinifex Pigeons



In general, birds keep a certain distance from conspecifics, though in the gregarious pigeons this space can be very small or non-existent, especially when roosting. When birds snuggle up against each other on a roosting perch they prevent heat loss on cold nights. These Scaled Doves are warming themselves in the first rays of the sun on a cold and windy dawn before moving off to feed. This close contact is a feature of the two *Scardafella* doves, and Inca Doves (*S. inca*) have been recorded roosting on the backs of other flock members.

[*Scardafella squammata* squammata, Pantanal, Mato Grosso do Sul, Brazil. Photo: Haroldo Palo Jr./NHPA]

Flocks of Crested Pigeons at exposed water-holes are wary, generally perching in surrounding trees until a courageous individual descends to drink; then the rest follow, though they remain watchful. Gregariousness in birds of open country has several functions: many eyes can spot predators and food more quickly; if predators do attack they can be distracted by the confusion of many moving targets, and fail to catch a single bird; each bird can feed or drink for longer, since it feels safer; and perhaps finding a mate becomes easier.

[*Ocyphaps lophotes*,
near Shark Bay,
Western Australia.
Photo: Kathie Atkinson/
Oxford Scientific Films]



It can be difficult to categorize the vocalizations of doves and pigeons using terms created for songbird studies. The flute-like "coo" of doves is equivalent to the territorial song of oscines, as has been shown for the American Mourning Dove, one of the best studied of all Columbidae. Pigeon vocalizations are apparently innate, developing without having to be learned, as is the case in songbirds. The "Advertising coo", also called "Perch-coo", is given by an unmated male to attract a female, so it could be termed the song.

[*Zenaida macroura marginella*,
Sonoran Desert,
Arizona, USA.
Photo: Stephen J.
Krasemann/DRK]

and Diamond Doves of Australia may visit a water-hole throughout the day and Namaqua Doves tend to drink at midday, while bronzewings and American Mourning Doves may drink way beyond sunset into the dark hours of early night. Some colour-marked Spinifex Pigeons were seen to drink once daily, whereas others visited a water-hole every other day, but one individual drank twice in one day. Some, perhaps many, green-pigeons, brown-pigeons and fruit-doves may not drink water at all, but derive enough moisture from their food to survive. In captivity, Pink-necked Green-pigeons, Black-naped, Black-backed and Pink-headed Fruit-doves, and White-eared Brown-doves have been raised on diets of fruit and yams with no drinking water for six years or more; these pigeons have in most cases shown no interest in drinking when given the opportunity and have successfully raised young under these conditions. Experiments with Inca Doves indicate that this species may also satisfy its water requirements by eating plant blossoms and leaves. White-winged Doves obtain some of their water from nectar and fruits of the giant saguaro cactus (*Carnegiea gigantea*). Galapagos Doves obtain some of their water by digging into the moist pulp of *Opuntia helleri* cacti.

Desert springs are often saline but may be the only source of water for American Mourning Doves at certain times of the year. Experiments have shown that these doves may maintain positive water balance by drinking from saline sources up to 0.15 in molarity. They suffer no ill effects when deprived of water or succulent food for four or five days.

African Collared-doves increase their body weight by 6-8% during incubation. At first glance, this weight increase might be attributed to the development of the crop glands, but crop weights of parents are about 0.9 g at laying time and increase to 3 g at the time of hatching of their young, amounting to a total of only 1.34% of body weight. It was ultimately found that most of the weight gain in adults was due to general hydration of the body tissue. This stored water was subsequently utilized in crop-milk production.

Breeding

Pigeons form monogamous pair-bonds, at least for the duration of a particular breeding season. This does not preclude extra-

pair copulations, as have been observed at least in the Rock Dove. Pigeons tend to have longer breeding seasons than many other birds and in many of the forms studied in some detail nests have been found throughout the year.

Although individuals of a species may be found breeding all year round, the population as a whole tends to exhibit an annual





On the basis of their feeding habits, pigeons can be divided into three broad groups: arboreal; terrestrial; and arboreal and terrestrial. Fruit-eaters feed almost wholly in trees on fruits and berries, each species having its own size preferences. The Many-coloured Fruit-dove takes all kinds of fruit, although the banyan fig appears to be of special importance. The bird forages mostly in the tree tops, though it will come lower and feed in shrubs, but it hardly ever visits the ground. Fruit-doves swallow fruits whole: their gizzard has a hard lining that rubs the flesh off the kernels, which are later excreted whole.

[*Ptilinopus perousii*
perousii, Samoa.
Photo: Roland Seitre/Bios]

breeding cycle. For example, active nests of Common Woodpigeons have been found during all months of the year, but 70% of the nests are concentrated over a period of three months.

Photoperiod triggers gonadal recrudescence in pigeons. Remarkably, some species studied do not show a refractory period typical of most birds, that is a short period after the breeding season when neither long photoperiods nor other factors may effect gonadal growth. For example Rock Doves, Common Woodpigeons and Band-tailed Pigeons with regressed gonads raised in long-day regimes in the laboratory will manifest testicular and ovarian growth irrespective of the time of the year.

Absence of a refractory period is adaptive for pigeons living in regions with unpredictable food supplies. By wandering and searching until they encounter food sources, these pigeons may start breeding regardless of increasing or decreasing day length. For example, nomadic Band-tailed Pigeons migrating into Mexico in autumn, after breeding further north, will experience renewed gonadal growth and breed anew if they encounter good mast crops. In mild climates the absence of a refractory period enables pigeons to extend their breeding season, even when day length shortens, given adequate nutritional resources, as has been demonstrated in the Common Woodpigeon. Thus food availability often interacts with photoperiod to regulate breeding activity in the Columbidae.

A refractory period has been described for highly migratory turtle-doves, preparing them for migration to the south. This prevents them from breeding during the months when they must moult and accumulate lipid reserves in preparation for their long journey.

Although increased photoperiod will stimulate gonadal recrudescence in desert forms, breeding activity does not commence unless triggered by rainfall. This mechanism limits the number of birds that will waste energy trying to breed in periods of drought.

Readiness to breed is manifested in a number of displays associated with advertising, pair formation, nest building, ag-

gression and defence. These displays are often conservative and may be used as taxonomic characters. Male pigeons, and sometimes females, have a display used to invite a mate to a nest-site or a potential nest-site, and this display appears to differ between the seed-eating forms and various fruit-doves. In its most typical form, the male crouches at the site, and holds his body with the tail pointed up, head lowered and wings held close in to the body. The wings are then twitched rapidly up and down, and in most species a vocalization is delivered at regular intervals; these vocalizations and the silent intervals between utterances are species-specific and are the classical "fixed action pattern" of the ethologists. Nest-shaping movements may accompany this display, with each foot making scratching movements while the body may be moved from side to side and partly rotated. This display is similar in various unrelated lines of pigeons such as *Columba*, *Streptopelia*, *Turtur* and *Columbina*. The rate and form of wing movement differs between species: in *Columba* and *Zenaidura*, it is a spasmodic twitching; in the Common Bronzewing, the partially opened wing is moved more slowly; in *Geopelia*, the closed wings are fluttered rapidly.

In the American Mourning Dove and related Socorro Dove, the nest display is accompanied by bowing, vocalizations and the spreading of the raised tail to reveal the white or grey tail spots. The Grey-headed Quail-dove (*Geotrygon caniceps*) performs this display in silence: the male bows and twitches his wings rhythmically, but every 20-30 seconds he suddenly spreads and lifts both his wings and then retracts them.

Twitching movements are also often seen when mates approach each other when sexually aroused. In the White-eared Brown-dove, both wings are raised over the back and quivered very rapidly, which is accompanied by the swaying of the body from side to side; this same wing quivering is seen in the nest display of this species, when the wings are slightly spread and lowered.

The Black-naped Fruit-dove twitches its wings and nods its head rapidly up and down during nest display. However, in con-

Like most members of *Columba*, the Common Woodpigeon feeds both in trees and on the ground. It is one of the European birds to have benefited most from agriculture; although still common in its original deciduous and coniferous forest habitat, where it feeds on a great variety of fruits, berries, acorns, leaves and the like, it is now equally at home in cereal fields, huge flocks foraging in stubble in autumn and winter, picking up grain of all kinds. Numbers can be so great that the species has become a serious pest in the eyes of some farmers, and around 10,000,000 are shot each year in Europe.

[*Columba palumbus palumbus*, Germany.
Photo: Robert Maier/
Animals Animals]



trast to all nest displays described to date, wing movements are absent in the nest displays of the Pink-headed and Black-backed Fruit-doves: an individual male crouches at a nest-site and, accompanied by single deep coos delivered at regular intervals, moves his head slowly up and down and shakes his bill rapidly from side to side. Unlike the case of the seed-eaters, head movements of fruit-doves are not in rhythm with the nest-calls. These movements are identical to those of nestlings or fledglings begging for food, and the wing twitching and wing quivering movements of seed-eating doves are also identical to juvenile begging displays. Nest display movements are probably derived from juvenile begging movements in both seed- and fruit-eating doves.

Many dove species perform aerial displays associated with courtship or in aggressive contexts. The male Rock Dove begins his display by flying from a cliff or building with exaggeratedly slow, deep wingbeats; this is followed by several loud wing-claps which precede a gliding phase, with the tail spread and the wings held up over the back in a dihedral, or "V"; the glide is followed by another clapping phase, and yet another glide, and this is repeated a number of times before the male descends to a perch, holding his wings in a "V" and commonly rocking from side to side.

The Common Woodpigeon commences its display by flying 20-30 m forward and up, and when it reaches the apex of its ascent delivers one to as many as nine loud wing-claps; it then glides forward and down for 6-7 m with the tail and wings spread and held slightly below the horizontal; the bird then ascends again, claps its wings at the apex and glides down. This climb, clap and glide-descent may be repeated up to five times before the bird lands.

Displays involving a steep ascent with loud clapping wings followed by a gliding descent with wings spread sideways or slightly below the horizontal are to be found in several unrelated dove taxa such as the Spotted, Zenaida, White-winged and Namaqua Doves, the Brown Cuckoo-dove, and the Crested Pi-

geon. The number of loud claps during the ascent may differ between species: the Ring-necked Dove (*Streptopelia capicola*) and Top-knot Pigeon clap only once during their ascent; the Ruddy Ground-dove claps once or twice; and the White-tipped Dove claps two or three times. American Mourning Doves produce a whistling sound with their wings rather than loud clapping, during the ascending phase.

The Band-tailed Pigeon's flight display differs from the above in that it is conducted along a horizontal plane. A displaying male will glide off a perch on a descending path for 9-12 m and then level off to trace a circular path about 45-185 m in diameter; the wings and tail are fully spread and the neck is fully extended; shallow wing-beats commence about half or three-quarters of the way into the circular flight and a high-pitched chirping call is produced.

One of the most spectacular flight displays is that of the Papuan Mountain-pigeon (*Gymnophaps albertsii*). The bird begins by flying almost straight up, tracing a spiralling path to a height of 25-30 m above the canopy. It then folds its wings partly or entirely and plummets almost straight down like a stone, finally pulling out of the dive and flying upwards back to its perch.

Most forest-living and ground-living doves do not have flight displays; for instance, they are absent in most of the ground living Australian species, including the Spinifex, Squatter, Partridge and Wonga Pigeons, and the Common and Brush Bronzewings (*Phaps elegans*); they are also absent in the forest-living *Chalcophaps* doves. Most *Ptilinopus* fruit-doves are denizens of forests and do not perform display flights, but the Orange-bellied Fruit-dove often occurs at the forest edge or in various disturbed habitats, and it performs display flights across clearings: there is a climbing phase with a series of wing-claps, as the bird leaves a tree, followed by a descent with the tail and wings spread and lowered below the body, reminiscent of a landing Common Teal (*Anas crecca*). A variation of this display involved an individual flying on a horizontal plane, then noisily climbing up be-



One of the true ground-feeders is the Cinnamon Ground-dove of New Guinea and nearby islands, which only exceptionally ascends into trees or even flies at all; its long legs are evidence of its terrestrial habits. Foraging on the forest floor, it seems to take more invertebrates than most pigeons. With its rapid walk over the ground and rather distracted air, the Cinnamon Ground-dove was described by the photographer as "appearing to be late for some appointment".

[*Gallicolumba rufigula orientalis*, near Port Moresby, Papua New Guinea. Photo: Brian J. Coates]

fore gliding quietly down, levelling out and continuing on a horizontal plane; this display is similar to that of the Flock Bronzewing. The forest-living Wonga Pigeon and *Chalcophaps* doves apparently substitute a flight display with advertising displays performed on the ground and on low perches near the forest floor. Various ritualized movements of the body and wings are utilized to attract a mate.

Although it is the male that usually performs flight displays, unpaired female Rock Doves may sometimes perform a less spectacular version of the display; paired females may display with the male but with less vigorous wing-clapping, and indeed males and females also use this display following copulation. In the Ruddy Ground-dove this display precedes copulation.

Rock Doves use their flight display to demarcate territory boundaries. A White-winged Dove or Band-tailed Pigeon performing a flight display often stimulates one or more neighbours to do so too, and up to six Band-tailed Pigeons have been observed displaying simultaneously, in a manner reminiscent of the countersinging observed in song birds or some doves.

As a prelude to pair formation or sometimes to copulation, pigeons perform a Bow-coo Display or an equivalent thereof. A typical bow-coo may be exemplified by the *Streptopelia* doves; in this display the male inflates his crop, holds his body tilted forward and, with the bill pointing down, lowers his body in a bow. Single frame analyses of film footage reveal that the amplitude of the bow, as well as the interval between each bow, is species-specific. The African Olive-pigeon (*Columba arquatrix*) opens and shuts its bill very rapidly, while uttering a barely audible song, as a prelude to a series of shallow bowing displays. Again, contraction of the pupil often accompanies bowing in pigeons, as yet another visual signal, and this is made all the more effective because iris colour frequently contrasts markedly with the colour of the bare orbital skin.

The Bow-coo of some dove species may be more elaborate: for example, the male Rock Dove inflates his crop, then raises his wings slightly at the "wrist", and spreads his tail; by raising his wings the frontal image of the pigeon is a bird of increased size, and in this posture he bows, delivers his complex coo, and turns in little pirouette movements. Sometimes he makes short flights over the female and then struts and dances again.

In some species ornaments on the plumage are shown to advantage by specific postures accompanying this display. For example, the Old World *Geopelia* species and the New World *Scardafella* raise and spread their tails as they perform a deep bow, revealing the black and white patterning on the rectrices. During the bow, the bronzewing species spread the tail and wings, with the latter tilted slightly forward to reveal the bronzy wing ornaments. During their bow, the large crowned-pigeons spread the tail and wings to display the white wing patches, but they also point the bill towards the breast so that their lacy crown feathers are spread and sweep the ground. The male Luzon Bleeding-heart spreads his tail then inflates his breast to show off the red breast spot before bowing. The Pink-headed and Black-backed Fruit-doves have a light and a dark band bordering the breast; during the bow-coo, the male faces the female then lowers his bill towards his breast; as he slowly bows, he utters a low-pitched coo, during which his breast is inflated and the frontal view, as seen by the female, is of two concentric half-rings formed by the light and dark bands, expanding, contracting, expanding a second time and then contracting again. The sonograph reveals that the two cycles of inflation and contracting of the breast are due to amplitude modulation of the coo, the alternating loud, soft, loud, soft segments of a frequency-sustained coo. Interestingly, these two species will also perform the Bow-coo on a perch with no audience, in which case it serves an advertising function.

Not all pigeons actually bow during the display so named. For example, *Zenaida* doves move the head up and down in a spasmodic manner, apparently as a prelude to display, then assume an oblique posture of the body with the crop inflated: in this static posture, the Perch-coo is delivered. Members of the genus *Turtur* and *Geotrygon* also perform static coo displays.

The Bow-coo of the Pheasant Pigeon is unique among pigeons. In this display the male stands on one spot with his head held down; the tail may be wagged rapidly up and down and he may repeatedly pick up and drop a pebble; this may be in silence, or a soft version of the advertising whistle may be delivered; he turns his back to the female when she approaches, and then utters a loud roaring sound, not unlike an electric motor! A tame female directed this display at the investigator, indicating that both sexes may perform it.

The picking and dropping of pebbles is reminiscent of "tid-bitting", a symbolic courtship-feeding display typical of the Phasianidae (see Volume 2, page 458), with which this species is convergent in several respects. The Grey-headed Quail-dove has been observed tid-bitting with mealworms or berries, and the White-faced Quail-dove (*Geotrygon albifacies*) has been recorded tid-bitting with small pebbles, once again convergent behaviour with chicken-like birds.

Bow-coo displays may be followed by copulation or by "billing", which itself usually precedes copulation. In billing, the female inserts her bill into the male's and he may then feed her, although sometimes the feeding is merely symbolic, as she inserts her bill only for a brief moment and then removes it.

Bow-coos may also be delivered in aggressive contexts: American Mourning Doves often posture and coo following a fight. This display is also performed during "Driving", the manifestation of mate-guarding in pigeons: when a strange male comes too close to a female, her mate may peck at her then display, in an effort to distance her from the possible sexual rival.

In most species it is only or mostly the male dove which gathers nesting material and carries it one piece at a time to the female, while she remains at the chosen nest-site and arranges and builds. In many species studied, the male usually climbs over the female's back and passes the materials to her from behind; indeed, it appears to be "psychologically" impossible for a male to approach the female from the front. A male American Mourning Dove was observed to approach a female on the nest from the front, to pause, and then to walk around to her back and pass her a twig over her "shoulder".

Arboreal species like the Band-tailed Pigeon and Orange-bellied Fruit-dove break off dead or dying twigs from trees or shrubs. Terrestrial species such as ground doves and Spinifex Pigeons collect nest materials from the ground. Each item picked up in the bill may be "tested" by the bird shaking its head one or more times; softer materials may be discarded.

Dove nests typically consist of a platform or shallow cup fashioned out of twigs or the dead stems of various plants. The

Costa Rican Quail-dove incorporates green moss and liverworts into the nest frame. The loose nature of dove nests may be adaptive in that they may dry out quickly after rain. However, looseness may not always mean flimsiness. The nests of Superb Fruit-doves were found to consist of about 54 sticks that were always forked and intertwined together in such a way that they were locked in place and difficult to pull apart.

Not all doves build shallow nests: the Olive-backed Quail-dove (*Geotrygon veraguensis*) builds a relatively bulky nest of twigs and rootlets lined with still finer twigs. Again, one White-tipped Dove's nest contained over 350 pieces of material and constituted one of the bulkiest pigeon nests on record. Also, ground doves of the genus *Columba* tend to build more substantial nests than most other doves.

Nest placement is partly dictated by habitat and partly by availability of preferred sites. Some Old World species, such as the Rock Dove, Speckled and Snow Pigeons, nest in crevices in cliffs, while others, including fruit-doves and the larger pigeons, nest in trees; Spinifex Pigeons and Flock Bronzews are obligate ground-nesters. Some doves nest equally in vegetation and on the ground, the frequency varying with the species. Galapagos Doves on the island of Genovesa nested on the ground or utilized old Galapagos Mockingbird (*Nesomimus parvulus*) nests, both sites being equally frequent. In contrast, only four of 271 nests of the Ruddy Ground-dove were placed on the ground, the rest being in vegetation up to 7.5 m above the ground. Zenaida Doves were found to place their nests low where predation was low, for instance in the Guanica Forest of Puerto Rico; on the island of Culebra they nested among boulders, and woodland populations often placed their nests in bromeliads. The Bare-faced Ground-dove nests on the sides of cliffs or on the ground, or makes use of holes in buildings; this is the only small dove that regularly nests in holes. The Stock Dove (*Columba oenas*) of Europe nests mainly in holes, and in a study in England feral pigeons also tended towards hole-nesting.

Whereas most doves nest solitarily and space their nests out across their habitat, some species nest colonially, the most fa-

Some pigeons specialize on particular fruits. The Yellow-footed Green-pigeon is particularly fond of cultivated mulberries and the fruits of pipal and banyan fig trees, in which it commonly feeds in towns and by roads, alongside hornbills (Bucerotidae) and barbets (Capitonidae). Up to 12 banyan figs have been found in one crop. The gizzard of green-pigeons is actually modified for grinding the seeds of figs, while the oesophagus is expandable so as to accommodate large fruits. The bird is a typically acrobatic fruit-eater, which comes to the ground only to drink.

[*Treron phoenicoptera chlorigaster*,
Ranthambore National
Park, Rajasthan, India.
Photo: Bernard Castelein/
BBC Natural History Unit]





A typical terrestrial specialist is the Common Ground-dove. Originally a bird of savanna, it has moved into cultivated land. It not only forages on the ground, picking up small seeds and scraps, but often builds its nest there. Unlike that of fruit-eaters, the gizzard of granivorous species is muscular and thick-walled, usually containing grit to grind the tough seeds.

[*Columbina passerina passerina*, Ding Darling National Wildlife Refuge, Sanibel Island, Florida, USA. Photo: Jim Zipp/Ardea]

mouse case being that of the Passenger Pigeon, which nested in colonies of thousands. The Nicobar Pigeon too often nests in colonies: one colony on Banban Island, off New Britain, was estimated to contain thousands of nests. Although nests of mainland Puerto Rican populations of Eared Doves are normally spaced out, at an average of 37 m from each other, one observer found them breeding in "thousands" on Little Taka Island, and White-crowned Pigeons at one site in Belize bred in a colony containing over 400 nests. Most members of the western subspecies of the White-winged Dove nest solitarily, although a few nest in colonies, but members of the nominate eastern race, *asiatica*, nest in a series of densely populated colonies.

Clutch size in doves is small, varying between one and two depending on the species. Species that normally lay two eggs per clutch may on rare occasions lay one or three. For example, of a selection of Galapagos Dove nests examined, 66 contained two eggs, one contained one and two contained three. Of 218 Ruddy Ground-dove nests examined 0.5% contained three nestlings. A pair of Pink-necked Green-pigeons kept alone in an aviary in southern California raised a brood of three young. Of 1203 American Mourning Dove nests where clutch size was known, 1169 (97%) contained 2 eggs, 24 (2%) contained 3 eggs, six (0.5%) had one egg and four (0.3%) contained 4 eggs. By following the 4-egg nests wherein laying intervals were known, it was concluded that these probably represented eggs laid by 2 different females in the same nest.

Clutch size is partly determined by the energetic costs of raising the chicks and partly by diet quality. The latter can be

best appreciated when one examines this question in the fruit-doves and imperial-pigeons, which are dependent entirely or almost entirely on fruit for their nourishment. These species all lay only one egg per clutch. Green-pigeons and brown-doves eat seeds in addition to fruit, and lay clutches of two. Fruit is very poor in proteins so it is energetically very expensive for a fruit-dove or imperial-pigeon to create an egg, but seed is richer in proteins and thus probably provides the extra nutrients required to produce a two-egg clutch. It is noteworthy that the African Green-pigeon (*Treron calva*) lays one-egg clutches in West and Central Africa but usually two-egg clutches in the rest of its range. It could be that West African populations are more frugivorous and less granivorous than other populations, but to date no-one knows.

Seed-eating doves generally lay two-egg clutches. Only one egg is normally laid by arboreal New World *Columba* species, such as the White-crowned, Plain (*Columba inornata*), Scaly-naped, Band-tailed and Ruddy Pigeons, although two-egg clutches are sometimes found in Scaly-naped and Band-tailed. However, despite the taxonomic situation of these species within the seed-eaters, these forms are actually dependent on fruit as the mainstay of their diet. One-egg clutches are also the rule in large terrestrial ground-feeding forms, such as the crowned-pigeons, the Pheasant Pigeon and the Thick-billed Ground-pigeon. One-egg clutches were also found in the extinct Dodo and solitaires.

Clutch size in birds is also restricted by the number of young the adults are capable of raising successfully. Crop-milk production is energetically expensive, and producing enough to raise healthy young requires the participation of both parents. Thus small clutch sizes, as found in pigeons as a group, are also partly due to their dependence on the protein-rich crop-milk for raising their young. These ideas have been tested by substituting eggs or chicks to create larger broods and by removal of one parent. For example, single eggs or chicks were added to nests of American Mourning Doves, Common Woodpigeons and Rock Doves to create supernormal broods of three. The growth rates of nestlings from supernormal broods were compared with those of chicks in broods of two or one, and it was found that they were reduced in members of the artificially enlarged broods. The underweight Common Woodpigeon chicks also suffered higher post-fledging mortality than fledglings from normal broods. Fledging with abnormal weights would thus mean reduced chances of surviving to reproductive age. Although the large ground-feeding forms *Goura*, *Otidiphaps* and *Trugon* do feed on large quantities of seed and invertebrates, their single-egg clutch is probably due to the fact that the parents can produce only enough milk to raise one healthy chick. It has also been suggested that one-egg clutches enable parents better to protect their squab during tropical rainstorms.



The breeding habitat of the Black-winged Ground-dove is scrubby arid areas and high valleys with some trees in the Andes, where it presumably feeds chiefly on seeds. When temperatures drop too low, it moves to the lower slopes or to the coast, frequenting towns and farms.

[*Metriopelia melanoptera melanoptera*, near Lake Uro Uro, Bolivia. Photo: Isabel Martínez Vilalta]

The first three days of a nestling dove's life appear to be the most critical, as these are the days when it is fed only crop-milk, as a result of which its shows among the fastest growth rates of any avian species. Beyond that age, even if parents are provided with an abundant seed supply, as in the captive American Mourning Dove and Rock Dove studies, they still cannot produce enough crop-milk between them to effect normal growth rates. Undernourished, stunted individuals also take longer to fledge, rendering them vulnerable to nest predators for a longer period.

Observations have underlined the need in almost all species for both parents to participate in raising normal chicks, for eggs were abandoned if one parent died or was removed. Chicks may be raised by one parent if the other disappears when the nestlings are 4-5 days old, but, even if an unlimited food supply is provided to the single parent, these chicks will still fledge under weight, again attesting to the dependence on a critical crop-milk supply for normal growth and development.

It has been shown that there is a significant linear correlation in egg weight and body weight in birds in general. Thus larger birds tend to lay larger eggs. However, when compared with other groups, pigeons tend to produce the smallest eggs relative to any given body size. For example a 400 g hawk would lay a 32 g egg and an owl of the same size a 27 g egg, but a pigeon of equal weight would produce an egg of only 18 g.

Hole-nesting *Columba* species lay proportionately larger eggs than open-nesting congeners. The significant factor here is that larger eggs represent a greater investment in energy and nutrients. Open-nesters are known to suffer higher predation pressure than hole-nesters, which means that there is a greater chance of losing their investment. Loss of a small egg would mean loss of a smaller investment in reproductive energy. In a form of compensation, open-nesters typically have to lay many more replacement clutches than hole-nesters, in order to achieve breeding success. The strategy that open-nesters have apparently adopted then is to lay smaller eggs, have a reduced incubation and nestling period and thus be vulnerable to predation for a shorter time.

On the other hand thermoregulation is more complicated for the smaller species. Laying a larger egg means hatching a larger chick which reduces its cost of producing body heat; this appears to be the strategy with the *Zenaida* and *Columbina* spe-

cies. The larger *Zenaida* species lay eggs averaging 6.1% of their body weight, whereas the small Galapagos Dove lays an egg 7.4% of its body weight; likewise, the smaller members of *Columbina* lay eggs that average 8.3% of their body weight, whereas the larger Picui Dove (*Columbina picui*) lays an egg only 5.8% of its body weight.

Larger fruit-doves tend to lay proportionately smaller eggs than the smaller species. The 247 g Wompoo Fruit-dove lays an egg 4.2% of its body weight and the 257 g Pink-spotted Fruit-dove lays an egg only 2.6% of its body weight, but 15 *Ptilinopus* species weighing 68-156 g lay eggs averaging 7.8% of their body weights. Because of the low protein content of fruit, frugivores must invest relatively more energy in egg production than granivores. Frugivores must also invest more energy in raising their chick, and this is especially costly for the smaller species. By starting with a larger egg which hatches a larger chick, the smaller species may actually be saving energy since the larger offspring will be more efficient at retaining heat than would a smaller offspring. Moreover, as has been suggested for manakins, a larger chick may be more efficient at processing fruit at an earlier age.

When comparing both eggs in an American Mourning Dove clutch, although the volume is the same, the second egg laid tends to be longer and wider than the first. During the middle of the breeding season the first egg usually contains a male chick and the second a female, but later in the season the sequence is reversed, with the first egg holding a female. The first egg of the Rock Dove also tends to contain a male chick.

Pigeon eggs are typically white although a few species lay buff-coloured eggs; the latter include *Gallicolumba* ground doves, quail-doves and the spotwing group of Africa (*Oena* and *Turtur*). Eggs of the White-tipped and Grey-chested Doves and the Ruddy Quail-dove vary from white to pale buff, while White-winged Doves lay white eggs with a faint buffy tinge.

White eggs are typical of birds that lay eggs concealed in holes, such as woodpeckers, honeyguides and barbets. White eggs laid in open nests are more vulnerable to predation than spotted eggs. Nesting American Mourning Doves in the wild were divided into two groups: in one group eggs were painted with spots and in the second group they were left unpainted as controls. Incubating birds were flushed from the nest every three days,

A ubiquitous background sound of the African bush is the far-carrying trisyllabic song of the Ring-necked Dove. The species is found in virtually all lowland habitats apart from dense forest. It takes a fairly broad range of foods: mostly seeds but also bulbs, fruit and invertebrates. Foraging is generally in pairs or small parties but large flocks will assemble at water-holes in particular, always a meeting place in the savanna. Flocks are very wary, the whole party rising as one at the first hint of danger.

[*Streptopelia capicola damarensis*,
Kalahari Desert,
southern Africa.
Photo: Nigel J. Dennis/
NHPA]





The four portraits on these two pages were taken at the same forest-edge pool in Papua New Guinea. In addition to the five pigeon species shown, two others were also observed there: the Cinnamon Ground-dove (*Gallicolumba rufigula*) and the Coroneted Fruit-dove (*Ptilinopus coronatus*), altogether a fine illustration of the region's wealth of Columbidae. Such pools are extremely important for birds in dry weather; pigeons need to drink at least once a day, frugivorous species probably less often. The upper photo shows an encounter of an Emerald Dove and a Stephan's Dove, the only two species in their genus, *Chalcophaps*. Both are ground-dwellers, the former occurring in more open areas and plantations, the latter in forest; thus their habitats overlap only at the forest edge. The Thick-billed Ground-pigeon is also a terrestrial bird. Its unusually heavy bill is used for chewing fruit and for hammering hard fruits onto the ground until they split open.

[Above: *Chalcophaps indica chrysochlora*, *Chalcophaps stephani stephani*.]

Below: *Trugon terrestris leucopareia*.

Both near Port Moresby, Papua New Guinea. Photos: Brian J. Coates]

the flushed birds sometimes staying away for as much as one hour. After some time it was found that white eggs were preyed upon more than spotted eggs, the latter thus having an advantage in being more cryptic.

How then do doves avoid attracting attention to their conspicuous white eggs? The answer is that they seldom leave their eggs exposed for long, since males incubate part of the day and females for the rest of the 24-hour cycle. Moreover, since there

are usually only two times daily when adults replace each other on the nest, there are few occasions when they may draw the attention of predators by movements near the site.

Male pigeons in general tend to incubate from early to mid-morning until early to mid-afternoon, the female taking over for the rest of the time. For example, a male Common Woodpigeon will incubate from 10:00 hours to 17:00 hours; a male Blue Ground-dove in Costa Rica from 7:30-8:30 hours



The Columbidae constitute one of the few avian families that drink by sucking rather than by the more usual scooping and head-tilting method; the Tooth-billed Pigeon (*Didunculus strigirostris*) of Samoa, a species with many aberrant characteristics, is the only pigeon to drink in this latter fashion. Sucking could be an adaptation to allow rapid water intake when the bird is vulnerable to predation, but some estrildid finches (*Estrildidae*) also suck up water, and experiments have shown that they do so no quicker than those estrildids that drink conventionally. Perhaps a better explanation is that sucking enables birds to exploit much smaller amounts of water, for instance tiny puddles or water trapped in leaf-bases. The Wompoo Fruit-dove occurs in many kinds of forest and is an arboreal species, whereas the New Guinea Bronzewing, also a forest bird, is partly terrestrial.

[Above: *Ptilinopus magnificus poliura*.

Below: *Henicophaps albifrons albifrons*.

Both near Port Moresby, Papua New Guinea. Photos: Brian J. Coates]

until 13:30-16:00 hours; the male Superb Fruit-dove incubates from about 8:00 hours to approximately 17:00 hours, a period totalling nine hours. The only exception discovered so far is the case of the Torresian Imperial-pigeon, which breeds colonially on small islands and flies long distances to the mainland to forage: each parent incubates for 24 hours at a stretch, so there is only one change-over time, at approximately 16:00 hours each day.

In the process of change-over during incubation the relieving bird usually alights some distance from the nest. Rather than flying off immediately, the incubating bird walks out of the nest for some distance before taking flight. This is probably an adaptation to prevent knocking the egg or eggs off the often shallow nest, but it is also adaptive behaviour in helping not to reveal to predators the exact location of the nest. Usually change-over is done silently, but in some species a soft coo may be uttered. In



The genus *Streptopelia* contains mostly generalists, many of them amongst the most adaptable of doves. The Red-eyed Dove occupies a great variety of habitats throughout Africa and in southern Arabia, and is equally at home in trees or on the ground, with a correspondingly varied diet. It is found at the forest edge and clearings, in gallery forest and in plantations, and takes a selection of seeds, berries, flowers, rhizomes, ground-nuts and invertebrates. One characteristic is that it is often found near water, in particular in mangroves and wadis, or near man, especially by farms.

[*Streptopelia semitorquata*, Gambia. Photo: Mike Wilkes/BBC Natural History Unit]

American Mourning and Zenaida Doves sitting females may utter a soft series of staccato notes which appear to beckon the male to approach. Common Woodpigeons change guard with wing quivering and soft nest-calling. The incoming White-crowned Pigeon often steps on the back of the incubating partner with a certain amount of cooing and growling, while the sitting partner frequently responds with nest-calls; this is often followed by preening or feeding of the mate.

It is noteworthy that the male Cloven-feathered Dove takes no part either in incubation or in rearing the young, an unusual practice, but one which may also occur in the superspecies comprising the Orange, Golden and Whistling Doves. The female Cloven-feathered leaves her nest for periods of a few minutes 3-4 times a day to feed herself rapidly and to defecate; in her absence the male does appear to keep close to the nest to protect it.

Pigeons do not have the brood patches that are typical in many other species of bird. Brood patches like those found in passerines consist of an area of bare skin situated on the abdomen, beneath which are oedematous cells supplied by many blood vessels; this bare patch is applied to the egg or eggs during incubation. This elaborate structure is necessary in order to effect rapid rewarming of eggs that have cooled after a period of absence by the incubating parent, but since pigeons rarely expose their eggs to the elements for long periods, rapid recovery of egg temperature is not necessary.

Pigeons living in hot environments have the problem of keeping eggs cool on very hot days. Namaqua Doves living in the Negev Desert in Israel will wet their bellies and apply them to the eggs to lower their temperature through evaporation. American Mourning Doves have been documented panting while incubating, with the result that heat from the eggs is transferred to their bodies and then dissipated through evaporation.

In general, incubation in the smaller species lasts 11-16 days whereas in larger species it takes 17-30 days. For example, the 46 g Croaking Ground-dove incubates for 14 days; the 46 g Ruddy Ground-dove 12-13 days; the 200 g Brush Bronzewing 16 days; the 500 g Pheasant Pigeon 23-26 days; and the 2000 g Victoria Crowned-pigeon (*Goura victoria*) 30 days. A notable exception to this rule is the 115 g Ruddy Quail-dove, the eggs of which take only 11 days to hatch.

Eggs pip 24 hours prior to hatching. An embryo in a pipped Tambourine Dove egg, when close to the human ear, was heard producing soft "cheep" sounds, and a two-day-old Croaking Ground-dove chick produced soft "cheep" sounds when disturbed. Otherwise, very small pigeon nestlings tend to be quiet. Their eyes are sealed on hatching and open at 3-5 days old, depending on the species and the individual.

Newly hatched pigeons have pink or black skin and are covered with white, yellow or buff down, depending on the species. In the Brown Cuckoo-dove, hatchling down is yellow, but merges into buff on the sides. Downy plumes in doves are hair-like in structure, rather than plume-like as in passerines, and dove nestlings tend to be more extensively covered with down than passerines. They are semi-altricial: Rock Doves are capable of some embryonic thermoregulation 27-37 hours prior to hatching, but depend on their brooding parents for additional heat to maintain optimal body temperature after hatching.

The bills of pigeon nestlings are dorso-ventrally flattened with inflated nasal opercula. They tend to be dark grey with a white or greyish white tip, bordered by a subterminal black band. This contrasting colour no doubt serves as a releaser of the parental feeding response.

The White-crowned Pigeon and its close relative the Scaly-naped Pigeon appear to be unique in the family in that two small projecting spines begin to appear at the base of each nasal operculum in four-day-old nestlings, and these remain until a few days after fledging. These projections are assumed to lock the nestling's bills in some way to the parents' buccal cavity during the process of food transfer. White-crowned Pigeon chicks cross-fostered under African Collared-doves often cause bleeding in the foster parents' mouths, presumably because the foster parents do not have the specialized reinforced palate of the chicks' real parents. However, the exact nature of this apparent lock-and-key mechanism is still unknown.

The parents will prod the chicks a few hours after hatching in an effort to feed them. The chick's lower mandible is boat-shaped and broader than the upper, undoubtedly functioning as a receptacle to collect the milk regurgitated by the parent. If one rubs the sides of the bill, which are very sensitive to touch, nestling Namaqua Doves, African Collared-doves and fruit-doves



The courtship displays of Old World *Geopelia* and New World *Scardafella* are rather similar in that the male raises and spreads his tail during the Bow-coo part of the ceremony to show off its strong black or brown and white pattern. This male Bar-shouldered Dove is probably just about to turn and face the waiting female before bowing and fanning his tail. The coppery neck feathers also play a part in the display; when they are slightly raised by the inflation of the crop, the total effect when seen head-on is impressive. The Inca Dove is a highly territorial species, more like a passerine than most pigeons in this regard, and consequently it has self-assertive displays in its repertoire that are aimed at other males. The posture seen here is probably designed as a threat (perhaps directed at the photographer!), since the tail is not fanned as when bowing to a female. When the male displays to the female at a potential nest-site, the posture is very similar but completely different sounds are uttered.



[Above: *Geopelia humeralis humeralis*,
Heron Island,
Great Barrier Reef,
Australia.

Photo: William Grey/
Oxford Scientific Films.

Below: *Scardafella inca*,
Saguaro National
Monument, Arizona, USA.
Photo: Ramon Torres
Valdivia]



In the genus *Columba*, the neck region can be the focal point of courtship display. One of the most spectacular examples is the dramatic effect achieved by the male Speckled Pigeon of Africa when he inflates his crop and raises his deeply bifurcated neck feathers during the bowing display. The male does not lower his head when bowing as much as in many other species. The impression is naturally at its most dramatic seen from the female's point of view, the red orbital skin and contrasting yellow irides contributing to the overall effect.

[*Columba guinea guinea*,
Gambia.
Photo: Mike Wilkes/
BBC Natural History Unit]

will open the mouth, and this is probably true of all doves. The parent prodding the nestling's bill undoubtedly stimulates it to open its mouth, as well as raise its head and insert its bill into the parent's buccal cavity. Very young birds are fed singly, but two chicks may be fed simultaneously once their eyes have opened.

The feathers of the forehead and chin are the last to grow out in nestlings of seed-eating pigeons, apparently an adaptation to prevent soiling of the feathers in this mode of parental feeding, but in these species the head is completely feathered by fledging time. In contrast, *Ptilinopus* fruit-doves fledge with the head and neck completely bald, probably because crop-milk is fed to the chicks long after fledging, in contrast to seed-eating species, which cease feeding crop-milk several days before fledging.

A detailed study of American Mourning Doves revealed that both parents fed their first hatchling a total of 14 times in a day, but when the second chick hatched 22 feedings a day were counted, and this feeding regime continued through day two. From day three until fledging chicks were fed 3-8 times a day.

In the Band-tailed Pigeon, during the first 19 days of its life, the single chick is fed exclusively by the male; the female joins him in feeding the chick on day 20. In contrast to American Mourning Doves, Band-tailed Pigeon chicks are fed only three times daily during their first week, and during their second week feedings are reduced to twice daily.

Both parents produce a special curd-like "crop-milk" which they feed to their young (see Morphological Aspects). Crop-milk contains almost no carbohydrates and comprises 75-77% water, 11-13% protein, 5-7% fat, and 1.2-1.8% minerals and free amino acids. The minerals include phosphorus, calcium, sodium and potassium. Unlike mammalian milk, crop-milk contains no lactose, a carbohydrate. Crop-milk also contains an as yet unidentified growth-promoting substance. Domestic chicks fed crop-milk mixed with starter grew faster than controls raised on starter alone. Slow growth rates are the typical pattern in birds with small clutch sizes, but this protein-rich food and the unknown growth-promoting factors facilitate rapid growth in all nestling pigeons, rendering them exceptions to the rule.

In American Mourning Doves milk was first detected on the eighth day of incubation, the amount then continuing to increase and peaking on the day of hatching. During feeding, the parent takes the newly hatched chick's bill into its mouth and then, with

vigorous pumping movements, regurgitates crop-milk into the nestling's mouth. As explained above, tactile stimulation of the sensitive sides activates the gaping response: when the parent touches the sensitive portions of the nestling's bill it stimulates the latter to open its bill in order to receive its food.

Regression of crop-milk activity varies among dove species and notably between granivorous and frugivorous forms. Fruits are rich in carbohydrates but poor in protein and fat as compared to seeds or insects: fruit contains only 1.3% protein as compared with 17.7% in insects and 11.3% in millet seed or 16% in sunflower seed. Thus fruit provides poor nutrients to developing chicks, as illustrated by the fact that the nestling period for insectivorous or granivorous passerines averages 12 days, for omnivorous passerines the mean is 14.2 days, but for frugivores it is a spectacular 22.3 days! The incubation period for frugivores is also disproportionately long: for example, in *Manacus* manakins it is 18-20 days instead of the 15 days which would be expected of a bird its size. In contrast, the much larger Ruddy Quail-dove's egg hatches in 11 days, and the nestling period is only 10 days. The fruit-eating manakin produces a nestling in an advanced state of development, that is capable of processing fruit, but because of the poor quality of fruit as a nutrient, its young take a long time to develop. Doves compensate for poor food quality with their protein-rich crop-milk.

For the first three days of life, the crop of the granivorous nestling American Mourning Dove is replete with crop-milk and contains almost no seeds. Seeds appear on day 4 and replace crop-milk as food, so that by day 9 crop-milk is absent altogether. From then on chicks are fed seeds and some invertebrates until fledging at 15 days old. Newly hatched Eared Doves are fed exclusively on crop-milk. A few seeds appear on day 1, but examination of crop contents indicate that parents select the size of seeds to be fed to their young. Chicks ranging in age from one to four days old are fed seeds smaller than 8 mm in length, and it is only beyond day 4 that the chicks are fed larger seeds.

In contrast, frugivorous White-crowned Pigeons fledge at about 15 days, at which time their crops still hold 35% milk; indeed, crop samples taken from fledglings at 20 days old still contained crop-milk in some cases. The chicks are highly dependent on parental feeding up to 40 days after hatching, suggesting that crop-milk may continue to be produced. The

Band-tailed Pigeon, which eats both fruits and seeds, is known to produce crop-milk for up to 30 days after hatching has occurred. The high protein content of seeds permits granivorous fledglings to be self-sufficient earlier, as they are less dependent on crop-milk for normal development.

Females of some species will lay again and incubate before the fledglings of the first brood have become self-sufficient. Among seed-eating species, such as the African Collared-doves and American Mourning Dove, the male's crop gland regresses more slowly than the female's by several days. This is partly because the male continues to feed the young until they are independent but also probably because the female has redirected the nutritional resources used in producing crop-milk to manufacturing the new egg or eggs.

In general, nestlings of the smaller dove species fledge at 10-17 days old, whereas the larger ones fledge at 20-36 days old. For example, Common Ground-dove chicks fledge at 11 days old, and Diamond Doves at 11-12 days. The slightly larger Inca Dove's chicks fledge at 14-16 days, and the various larger *Columba* species of 200-500 g fledge anywhere from 21 to 28 days old.

Notable exceptions to the rule in larger species are nestling periods for the 2000 g *Goura* species, which, like the *Columba* species, fledge in about 28-30 days. The Ruddy Quail-dove's chicks fledge in only 11 days, the Spinifex Pigeon's in nine days, and that of the Superb Fruit-dove fledges in only seven days. The often-published fact that nestling Nicobar Pigeons spend some three months on the nest before fledging appears to be erroneous, as a bird hatched in an aviary fledged naturally after about a month.

Nestlings of birds that build open nests tend to grow faster and have shorter fledging periods than species nesting in holes. This is apparently due to high predation pressure on open-nesting versus hole-nesting species. This principle also applies to pigeons. In general, nestling pigeons from open nests fledge at 50-70% of adult weight. Thus, Tambourine Dove chicks fledge at about 55% of the adult weight, Croaking Ground-doves at 57-66%, American Mourning Doves at 61%, and Common

Woodpigeons at 73%. The hole-nesting Stock Dove, however, fledges at 100% of the adult weight. Feral pigeons, which are partially hole-nesters, fledge at 84% of adult weight. Speckled Pigeons, which are also partially hole-nesters, fledge at 77% of adult weight. The South American Bare-faced Ground-dove also breeds in holes, but to date we unfortunately have no data on fledging weights of this very interesting species.

Dove chicks disturbed by a predator or a human may leave the nest prematurely. Torresian Imperial-pigeons will jump from the nest and flutter to the ground if disturbed. However, the chick is capable of climbing up the vegetation back into the nest once the coast is clear. One startled chick was seen to run 4.5 m away from its nest tree, and then return and climb 1.5 m up the tree back into its nest. Climbing was achieved with the use of the grasping feet aided by the wings and bill, a form of behaviour reminiscent of nestling Hoatzins (*Opisthocomus hoazin*).

Although most pigeons do not breed until they are about one year old, a few species have been shown to breed the same year in which they were hatched. A Common Ground-dove in southern Texas bred when it was 79 days old, and a Ruddy Ground-dove and an American Mourning Dove bred when three months old, while a captive Eared Dove bred for the first time when four months old. Such breeding precocity is unusual among birds and undoubtedly in part contributes to the success of various dove species.

Movements

Most dove species tend to be relatively sedentary. Some may form post-breeding flocks, but these tend to make only local movements. Some make diurnal movements from roosting sites to feeding sites and these may involve fairly long distances. For example, Speckled Pigeons fly 32-40 km daily from their cliff roosting sites to the cultivated areas where they forage; Rock Doves in parts of their range make similar trips covering some 20 km between breeding and foraging sites; and Socorro Doves were reported making daily trips from their cloud forest homes

The Brown Cuckoo-dove has a typical pigeon display-flight but a courtship display that is much less demonstrative than in many other pigeons: the bowing element, during which the male does not lower his head beyond the horizontal, is slow and rather stately; the tail is neither spread nor raised, and the male does not walk while displaying. After this prelude, copulation is a fairly straightforward matter. The female crouches immobile, inviting the male to mount, and he simply jumps on her back.



[*Macropygia phasianella*, Queensland, Australia. Photos: Brian J. Coates]



It is probably an ancient trait of Columba species to build their nests in rock crevices and holes in trees. Such a cavity provides good shelter against adverse weather and protection from many predators, while it requires only some lining material rather than many twigs. In addition to holes in ageing poplars, elms, planes and fruit trees, the Pale-backed Pigeon of western Central Asia uses old burrows of other birds and mammals (particularly along riverbanks), crevices in loess cliffs, and holes on buildings. The success of this strategy can be seen in the habits of the feral pigeon of the world's cities; most people never see a pigeon's nest because they are so well hidden on buildings, bridges and other constructions.

[Columba eversmanni, Ili River Valley, south-east Kazakhstan. Photo: Vladimir Morozov]

Although the largely terrestrial Emerald-spotted Wood-dove never feeds in trees, it is compelled to build its nest there because of the host of predators that abound in its African savanna and thornbush habitat. A ground nest would be quickly plundered. The nest is placed on a stump or in a bush or tree, generally about 2 m above the ground. The pair-bond of this species lasts for many years and the two birds very often nest on the same site year after year. One consequence of this is that the small nest quickly becomes fouled with droppings.

[*Turtur chalcospilos*.

Photo: J. R. Peek/Aquila]



at 600-800 m to *Ficus* woods in valleys below at about 60 m elevation.

Some species make regular trips across water. For example, some populations of Pied Imperial-pigeons breed on small islands off the coast of Thailand, but make daily trips to the mainland where they forage in mangroves, coastal woodlands and plantations. Similarly, insular populations of Namaqua Doves living on Zanzibar make daily trips to the African mainland during the dry season.

Some doves are nomadic in habit, visiting areas of ephemeral food production. The Flock Bronzewing of Australia feeds mainly on grass seeds which abound after a spell of good rainfall. Because of the erratic occurrence of rainfall in the Australian interior, successive irruptions of Flock Pigeons may be thousands of kilometres apart, as the birds wander all over the drier parts of the continent in search of forage. Some populations of the Band-tailed Pigeon tend to be nomadic outside the breeding season, when they travel in search of good acorn crops. The Passenger Pigeon was another nomadic species, its utter dependence on mast crops eventually leading to its demise (see Status and Conservation). The Eared Dove can be particularly abundant in the semi-arid north-eastern regions of Brazil, where it gathers in large flocks and breeds in areas with a good food supply, where *Croton* seeds have been planted; some of these breeding colonies may number 1,000,000-10,000,000 doves. The doves disperse when breeding is over and the food supply exhausted, and then fly off in flocks of thousands until they find another good *Croton* seed crop where they then settle and breed again.

Some high-altitude species nesting in the Himalayas or southern Andes make altitudinal migrations to lower and warmer levels to pass the boreal or austral winter. The Snow Pigeon, which may breed above 3000 m in the Himalayas, often moves to 1500 m to overwinter. The Plumbeous Pigeon (*Columba plumbea*) which breeds in the mountains of Itatiaia, Brazil, also engages in a post-breeding movement to lower altitudes. The Ruddy Pigeon breeds from 1500 m to the timber-line in the mountains of Costa Rica, but populations inhabiting the Caribbean slope may descend to 900 m at the end of the breeding season.

Although no pigeon is known to engage in the impressive migrations from the Arctic to Antarctica described for some birds, some pigeons do nonetheless, participate in annual journeys over

rather long distances. The Chilean Pigeon (*Columba araucana*) breeds in highland forest zones in Chile from the central fiordlands to 37° S, and into adjacent Argentina, but flies north to central Chile to spend the winter. Again, the Picazuro Pigeon migrates from Brazil to the Paraguayan Chaco after the breeding season.

To date, good migration studies on pigeons are not many, although much of the research carried out on bird navigation has been performed using pigeons (see Relationship with Man). Common Woodpigeons in the British Isles are mostly resident, but many northern continental populations that breed in areas with hard winters migrate south to France and the Iberian Peninsula, where they feed on acorns in areas of high productivity. Some winter roosts number over 2,000,000 birds. Ringing conducted in Britain between November and March revealed that 87.5% of the adults and 65.5% of first-year Common Woodpigeons were recovered within 40 km of their respective ringing sites. In north-west Europe, where the species is partially migratory, some 45-70% of the pigeons were estimated to be winter residents, but birds from north-central and north-eastern Europe and western Siberia are mostly migratory. One pigeon ringed at Oulu, Finland, was recovered 3675 km away in Lisbon, Portugal. Some individuals winter in Morocco and east to Iraq.

Some species have to cross water on a seasonal rather than daily basis, when travelling between their breeding and non-breeding grounds. For example, Torresian Imperial-pigeons migrate from New Guinea to Cape York Peninsula in north-eastern Australia, in July, then spread south and west along the Australian coast to breed, subsequently making the reverse journey in January. Flocks of 50-100 birds, sometimes as many as 300-500, may be seen a few kilometres off-shore, flying about 20 m above the sea.

The European Turtle-dove nests in central Asia, Europe and North Africa. Northern populations will fly south in the autumn, crossing the Mediterranean, to winter between the Sahara and equatorial Africa; as many as 1,000,000 individuals have been counted wintering in Gambia. Turtle-doves ringed in north-western Europe have been recovered in south-west France and Iberia, and it is known that such birds regularly reach Africa via the Straits of Gibraltar. On the other hand, some doves pass through the Balkans and Italy, entering and leaving Africa through Tunisia and Libya. During peak migration, up to 20,000 doves per



The nest of the Slender-billed Cuckoo-dove is somewhat larger and bulkier than is typical in pigeons, sometimes reaching as much as 30 cm in diameter. It is constructed mainly of sticks, although a few leaves or fragments of fern are often included too. The nest is adequately supported by the large leaves of a pandanus, a palm-like plant common throughout much of the species' range, but it may alternatively be placed in the midst of a tangle of vines or at the top of a small tree. Very little is known of the breeding habits of this species; interestingly, both the male and the female were seen incubating at this nest.

[*Macropygia amboinensis*.
Photo: Clifford & Dawn
Frith/Bruce Coleman]

day have been recorded passing through Malta. Asiatic birds, in turn, enter north-east Africa via Arabia, and some 3,000,000 have been estimated to pass through Iraq in autumn along a 100 km front. By exhibiting a broad-front migratory pattern, European Turtle-doves are unique among migratory pigeons, as other species use narrow flyways.

The Nicobar Pigeon is an insular species nesting from the Andamans and Nicobars east to the Solomons. In South-east Asia these magnificent pigeons are found on islands off the coasts of Thailand, Myanmar and Cambodia, and also on the island of Con Son off Vietnam. This species is a powerful flier that is capable of flying long distances without resting. Birds are known to wander or migrate between island groups and sometimes even stray to the mainland, but precise details of their migratory movements are lacking.

The migratory habits of the Namaqua Dove appear rather complicated, and at present exact details of its movements are lacking, but marked seasonal fluctuations in numbers in some areas indicate that, while some populations may be sedentary, others are given to making local movements in certain seasons, and yet others are markedly migratory. Movements are indicated by the fact that, although this is a common species in northern Nigeria during the dry season, the birds disappear once the rainy season begins. Similarly, some birds remain in Zimbabwe during the wetter months of summer, but the species becomes commoner during the dry winter. In general, Namaqua Doves tend to concentrate in huge flocks near water sources during the local dry season, but in the Kruger National Park in South Africa, for example, populations fluctuate with no clear annual cycle. One instance of a long-range movement within Africa was given by a Namaqua Dove ringed in Namibia and subsequently recovered 1000 km to the east at Bulawayo, in Zimbabwe.

The Laughing Dove is partially migratory in southern Africa, birds appearing to move west in about March to April and then returning on an easterly course in about August or September. In April 1963, over 12 mornings some 4000 birds were observed moving west along the River Zambezi at Feira, Mozambique. The species evacuates south-east Botswana completely in the dry season, and is absent from Namibia during the hot months but numerous in the winter months. In Barotseland, south-west Zambia, it is rare or absent during the rains in winter, but appears in good numbers during the dry season. One bird

ringed at Maun, Botswana, was recovered 800 km away to the east at Gatooma, Zimbabwe.

Some populations of three extant species of North American pigeons are migratory. The western race *mearnsi* of the White-winged Dove breeds from southern Arizona and California into Sonora and Sinaloa, and migrates further south to the states of Jalisco, Colima, Michoacán and Guerrero. The eastern, nominate race *asiatica* breeds from southern Texas south to Tamaulipas and Nuevo León, flying down the east coast of Mexico and crossing the Isthmus of Tehuantepec to winter in southern Mexico and Central America, as far south as north-western Costa Rica. The two races occupy exclusive, non-overlapping breeding and wintering ranges and migratory routes.

Californian populations of the Band-tailed Pigeon are non-migratory although they may form post-breeding flocks that wander in search of acorns, but populations from the mountains of Oregon, Washington and British Columbia fly south to winter in the foothills of California. Rocky Mountain Band-tailed Pigeons fly south to winter on the Mexican Plateau.

By examining specimens of American Mourning Doves taken by hunters in Georgia and Texas in early autumn as against late winter, it was found that autumn migrants are mostly of the eastern race *carolinensis* and winter flights of the western race *marginella*. Timing of migration thus differs between the two subspecies. There were also differences in timing of migration between age-classes, early flights being composed mostly of young of the year and later flights consisting mainly of adults. A study conducted in Arizona revealed that immatures began migration in August, followed by adult females and finally adult males. Although birds from the northern part of the species' range migrate each year, a small portion of the population tends to remain on the breeding grounds to overwinter; a study conducted in Missouri revealed that it was mostly adult males that overwintered, indicating that males winter further north than females. The phenomenon of females wintering further south than males is well known in many songbird species.

Relationship with Man

Doves have figured prominently in the folklore and religion of diverse cultures since ancient times. In China, the dove repre-



The main pressure determining where a species builds its nest is predation: ground nests are threatened by terrestrial predators, tree nests by climbing or flying predators. The dove has to arrive at the best compromise given the possible nesting sites available in its habitat. The American Mourning Dove, with its extensive range throughout North and Central America, builds its open nest in all sorts of sites in many different habitats: on the ground, in bushes and trees, or on buildings. This bird seems to have found an excellent solution in its desert habitat, presenting a prickly challenge on its saguaro cactus (*Carnegiea gigantea*) to both terrestrial and aerial predators. As a further safeguard, this species also has a wide repertoire of distraction displays to draw an enemy away from a nest containing eggs or young.

[*Zenaidura macroura marginella*,
Sonoran Desert,
Arizona, USA.
Photo: John Cancalosi]

sents faithfulness, filial piety and longevity. In the Sumerian flood myth, written some 6000 years ago, a "dove" was released from the ark and returned that same night, while in the Hebraic version Noah's dove returned with red mud stuck on its feet, a sign that the floods were beginning to subside. A Portuguese legend tells us that while God was instructing birds how to build their nests, doves preferred to play. The flimsy nests typical of many dove species, the legend tells us, are the result of their not having paid heed to their divine instructor.

The dove's repeated association with fecundity was probably spawned by its high reproductive capabilities. Examples include a fertility symbol from the eastern Mediterranean dating back to some 6500 years ago, which depicts a female figure with a dove perched on her upraised arms. Kamadeva, the Hindu God of Love, is depicted riding on a dove for his steed, and armed with a quiver of flowers. The dove is associated with Aphrodite of ancient Greece, and later with Venus of Rome, both names for the Goddess of Love. In the Christian religion the dove is symbolic of the Holy Spirit, also known as "Agape", the Greek word for love.

Doves are often mentioned in literature. William Shakespeare seemed to have a first-hand knowledge of dove biology, and he may either have kept them himself or enjoyed the company of pigeon breeders. In *As You Like It*, we find Rosalind saying to Orlando: "I will be more jealous of thee than a Barbary cock-pigeon over his hen." This is undoubtedly a reference to mate-guarding and driving. Shakespeare was also aware that pigeons raised their young on crop-milk for in *A Midsummer Night's Dream* we hear Bottom exclaiming: "I will roar you as any sucking dove".

In Elizabeth Barrett Browning's poem "My doves" we read: "And there my little dove did sit with feathers softly brown". In one of the more splendid examples of onomatopoeia in English literature we find in Alfred Lord Tennyson's poem "The princess":

"The moan of doves in immemorial elms.
The buzzing of innumerable bees."

Not only in literature, but in many aspects of life, the dove is very commonly taken as the symbol of peace. In Shakespeare's *Henry IV* we find Westmorland saying:

"Whose white vestments figure innocence
The dove and very blessed spirit of peace".

However, not all doves are peaceful: as any dove breeder will testify, the family contains some of the most aggressive birds in the avian world. Socorro Doves are so aggressive that they will even attack pheasants, and one breeder records one killing a rosella parrot (*Platycercus*) in his aviary. It is almost impossible to keep two pairs of White-breasted Ground-doves (*Gallicolumba jobiensis*) or Spinifex Pigeons in the same aviary, as one pair will almost invariably kill the other. Curiously, however, an aviary in the Taronga Park Zoo in Sydney, Australia, holds several hundred White-breasted Ground-doves breeding in a colony like domestic pigeons, while the Los Angeles Zoo, USA, once had an aviary holding a whole host of Spinifex Pigeons. Apparently, once a flock reaches a critical number destructive aggression would appear to cease; this phenomenon is well worth investigating.

In some countries certain pigeons may feed on cultivated grains, and so are treated as pests and eliminated by poisoning: for instance, in São Paulo and Paraná, Picazuro Pigeons cause damage to newly planted crops, and are combated with poisons. In Argentina, Spot-winged Pigeons and Eared Doves, which are considered crop pests, are likewise destroyed by means of toxins, and at Villa Ascasubi, home to an estimated population of 3,000,000 Eared Doves, 420,000 individuals were killed with a single treatment of strychnine baits.

On the other hand, pigeons are often an important source of protein for humans throughout the world. Their flesh is highly prized, so they are managed and hunted on a grand scale in a number of countries. The average annual harvest of American Mourning Doves in the USA between 1983 and 1987 was of a staggering 45,621,045 birds. Combining the results for British Columbia (western Canada), Mexico and Central America from



The young of the large crowned-pigeons hatch after some 30 days of incubation and fledge when about 28-30 days old, relatively short periods in relation to the 2000 g weight of their parents, and indeed similar periods to those needed by much smaller *Columba* species. Contrary to the general rule whereby the young of single-egg species experience slow growth, pigeon squabs have a rapid growth rate thanks to the unique crop-milk fed to them by both parents. Compared with other pigeon nests, those of the crowned-pigeons are very bulky and solid. The beginnings of the spectacular crest are clearly visible on this Western Crowned-pigeon nestling.

[*Goura cristata cristata*,
Irian Jaya.
Photo: Brian J. Coates]



Birds nesting in the open in rain forest are particularly vulnerable to predators; one strategy to counter this is to have short incubation and fledging periods, but in the fruit-doves these periods are actually longer than in many other pigeons, the main cause probably being the poor nutritional content of their fruit diet.

However, the nestling does develop more quickly on its diet of crop-milk than if it were dependent on fruit. As typified by this young Crowned Fruit-dove, almost all pigeon squabs have a pale bill-tip with a dark subterminal band, a contrasting pattern presumably enabling the parents to find the bill of their young quickly, and acting as a releaser for the flow of crop-milk. This remarkable substance, produced by both parents, consists of about 12% protein, 6% fat and 1-2% minerals and amino acids, the remainder being water but no carbohydrates.

Experiments have shown that it does indeed promote rapid growth in nestlings. These Wompoo Fruit-doves show how the squab stimulates the production of crop-milk by putting its bill into the buccal cavity of its parent, which in turn touches the sensitive sides of the nestling's gape to make it open up. Ptilinopus squabs have naked heads since they are still fed crop-milk long after fledging, again because of the low quality of their fruit diet.

[Above: *Ptilinopus coronulatus coronulatus*.

Below: *Ptilinopus magnificus poliura*.

Both near Port Moresby, Papua New Guinea. Photos: Brian J. Coates]



Where a nutritionally valuable diet is available, pigeons can afford to raise two young. Occasionally one chick will grow faster than the other, which can result in the weaker one's death. European Turtle-doves feed their young exclusively on crop-milk for the first five days, followed by a period of milk and "normal" food, then after nine days the young have the same diet as their parents. In one study of the species, somewhat surprisingly 86% of young in broods of two fledged successfully but only 67% in broods of one.

[*Streptopelia turtur*.
Photo: Mark Hamblin/
Oxford Scientific Films]

Guatemala to Costa Rica, the bag averaged 3,559,400 doves in those same years.

Eared Doves are an important part of the diet and economy of the locals in Ceará, north-east Brazil. Some 100,000 per week may be killed during the migration season, when these doves gather in enormous flocks. By "spotlighting" at their drinking holes after dark, one person may take as many as 800 doves in a single night! The doves are salted and dried and packed in 50 kg bales, which are then transported in trucks. Eggs are also harvested during the breeding season, and sold by the litre.

The extinct Passenger Pigeon was exploited on an even grander scale. In 1871 one breeding colony in central Wisconsin numbered 136,000,000 pigeons. In that year 600 professional hunters took 1,200,000 pigeons, amounting to about 1% of the adult population. The year 1878 was the last that yielded a good bag of these unfortunate birds.

On Tench Island, off Papua New Guinea, locals often collect nestling Nicobar Pigeons to be hand-fed in captivity. Later, as adults, these birds are taken to market and sold like chickens. Some of the imperial-pigeon species are also sometimes taken as nestlings and fattened on coconut and kitchen scraps before being eaten.

Domestication of a species would facilitate the harvesting process. Grain-eating species lend themselves readily to being domesticated, as their dietary requirements render them easy to care for. Indeed, it is worth remarking that most domesticated birds are granivores, including chickens, geese, canaries, several finches and various dove species. The Rock Dove appears to have been domesticated in the eastern Mediterranean region around 5000-10,000 years ago, probably by grain-farmers. It is thus the earliest known domesticated avian species. Perhaps, as in the case of the Nicobar Pigeon, young squabs were taken from nesting caves then fattened in cages until large enough to be consumed. If some were held captive long enough for them to lay eggs in their pens and then incubate and hatch young, this could have been the first step to domestication.

Consciously or unconsciously, humans probably first selected, for their tameness, docile birds that could breed easily in small enclosures. Instead of leaving the nest in terror at the owner's appearance, as a wild-caught captive is prone to do, the domestic pigeon sits tight on its eggs. Directional selection for

fecundity probably followed. Wild Rock Doves produce no more than two or three clutches a year, or at most six young. In a well run commercial programme, pairs average 12-14 squabs a year, and some have been recorded producing 16-22 squabs. Early sexual maturity was also selected for. Whereas a feral pigeon normally does not breed until at least six months old, homer hens have been known to lay at only 95 days old.

Since pigeons were and are important as food, one would expect humans to select for large size and more meat. Thus, giant breeds were selected for such as Kings, Runts, Carneaus and Valencian Giants. Darwin noted that an ancestral Rock Dove weighs about 400 g at the most, whereas a modern-day Runt may weigh 1371 g and a Valencian Giant up to 2286 g.

In addition to selection for good meat production, various mutations were selected for as objects of beauty, giving rise to such absurd-looking forms as: Pouters and Croppers, with large, hypertrophied breasts; Fantails, with supernumerary tail feathers; and Carriers, with an enormous cere and outsize orbital skin. In addition to forms and sizes, each breed may be represented by many colour varieties: the Italian Modena breed may be found in 152 colour varieties, and the Catalonian Tumbler in 318 colours and combinations. They have also been selected for ornaments such as crests, large feather collars and feathered tarsi. In Darwin's day some 150 breeds of domestic pigeons were known, but today the number of domestic varieties exceeds 350.

Domestic pigeons were also selected for specific aspects of their behaviour. In the sport of pigeon racing, pigeons have been selected for their speed of flight and their ability to home. Competition racing developed in Belgium during the early part of the nineteenth century at such centres as Antwerp and Liege, and the Racing Homer of today was developed from crosses involving, among other breeds, the now extinct Belgian Smerle or Smerle of Liege and the Horseman. Accounts of the extinct Belgian Smerle indicate that it was a strong flier capable of homing at speed from a distance of 807 km.

Independently of the Belgians, the English also selected for a racing breed by making crosses involving mainly Carriers, Tumblers and Dragoons. A number of famous racing strains, named after their creators, were soon recognized. One of the most prominent names is that of N. Barker of Belgium who eventually sold his birds to J. W. Logan of England in the late 1870's.



Many species of frugivorous pigeon have to adopt nomadic habits, since trees bearing suitable fruit might grow some distance from each other depending on the season. The Topknot Pigeon habitually feeds on trees until the fruit supply is exhausted, when it is forced to move around to find fresh feeding grounds, travelling in flocks of up to 200 birds. One consequence of its nomadism is that its nests are difficult to find; indeed, the first was discovered only relatively recently.

[*Lopholaimus antarcticus*, Lamington National Park, Queensland, Australia. Photo: Glen Threlfo/Auscape]

Good competition homers can fly 800-1000 km per day. They fly at an average speed of 50 km/h and some have been known to reach 66 km/h. One outstanding record of homing ability was by a pigeon called "Charlie", which in 1986 crossed the Atlantic from Guernsey in the Channel Isles, covering a distance of 7588 km to land at Fortaleza in Ceará, Brazil, still in good physical condition! Large sums are often staked in competition racing, so that good racing pigeons may, in turn, fetch high prices. One racing Homer was recently bought by a Japanese syndicate for US\$350,000.

Domestic Pigeons have also been selected for specific flight patterns. Birmingham Rollers have been selected to roll backwards at great speeds during the glide phase of the flight display. Rather than engaging in a long roll, the various breeds of Tumbler pigeons flip backwards two or three times in the course of their forward flight. This strange ability was noted in 1248 by Frederick II von Hohenstaufen in his great opus, *De Arte Venandi cum Avibus*, the first ornithological text in modern history. Swing Pouters have been selected to trace a U-shaped path rather than a straight one during the glide phase. Swing Pouters clap 20-30 times during the clap phase, in contrast to the 3-4 claps of their wild ancestor. Tipplers have been selected for sustained bouts of flying, and good Tipplers may stay in the air for at least 14 hours. Occasionally birds will stay up for 16 hours, and three birds have been recorded flying continuously for 19 hours, 35 minutes.

In addition, domestic pigeons have been selected for specific qualities of voice. The roughly one-second-long song of the Rock Dove has been lengthened by selection to 30-60 seconds in Altenberger and English Trumpeters. Laughters, developed in the Middle East, have been bred for special tonal qualities as well as long duration: their coos have been selected to sound like quacks of a duck, due to stacks of harmonics and overtones. Moreover, the songs of each of these breeds also differ in rhythm, that of the Altenberger Trumpeter having the most rapid rhythm.

Wild Zebra Doves exhibit geographical variation in song, manifested as the number of notes, the rhythm and the duration of terminal elements. In the Sunda subregion this species has been domesticated: thousands are bred in small cages and have been selected for certain qualities of their song. Doves are pitted in open singing competitions which may sometimes attract several thousand entrants.

Two other dove species have been domesticated, the African Collared-dove and the Diamond Dove. These now exist in many colour varieties such as whites, fawns, pids and silvers, and African Collared-doves with "frilled" feathers have been selected for, a mutation also known in domestic pigeons.

Because of their speed of flight and legendary homing abilities, pigeons have been used as messengers in times of war since antiquity. Early Assyrians, Egyptians, Lydians, Persians and Phoenicians reputedly used pigeons in military operations. However, the earliest documented record of the use of pigeons as a military aid was that of Prontinus, who reported that Julius Caesar used pigeons as couriers during his conquest of Gaul. Gibbon noted that pigeons were also used by crusaders during the siege of Acre in the Middle Ages.

During the four months of the siege of Paris in the Franco-Prussian war of 1870, pigeons carried 150,000 official and 1,000,000 private communications to the besieged Parisians. Pigeons were also important couriers during both the First and Second World Wars. During the First, the British air authorities documented 717 messages delivered by pigeons from planes in distress that had fallen into the sea. Some 17,000 pigeons were parachuted to resistance movements in France between 1939 and 1945, but only 2000 returned home.

The renowned "Cher Ami" was a pigeon attached to the New York battalion of the 77th division of the US army. In October 1918, troops of this division surrounded by enemy forces were cut off from support and short of rations. Several messenger pigeons were released, only to be killed by shrapnel. Cher Ami rose with his message through a barrage of shells and bullets and was soon hit, but with one leg shattered and a wound through the breast from the shrapnel he flew 40 km in 25 minutes to his home loft, the message holder attached to the wounded leg hanging by a few shreds of sinew. Cher Ami saved the lives of the "lost battalion". On a similar occasion, despite a shrapnel wound that carried away his left eye and left a gash on the top of his head, another pigeon known as the "Mocker" carried vital information enabling US forces to locate and silence guns which held up their advance. He was awarded the American DSC and the French "Croix de Guerre".

Pigeons and doves have been used as subjects in various major scientific investigations. Much is known about inheritance

of morphological and behavioural traits from experiments crossing different breeds of pigeons. African Collared-doves have been used extensively in studies of endocrinology. Also, pigeons are often used by psychologists in learning experiments.

Because of their remarkable homing ability, pigeons have been important "guinea-pigs" in the study of orientation and navigation, both in columbids themselves and, indirectly, in birds in general. Homing requires the use of a compass and a map: a compass enables a traveller to orientate himself in a fixed direction in relation to magnetic north; a map enables a traveller to find home from unfamiliar localities or surroundings. Pigeons have been shown to use the sun as a compass during homing. Their internal clocks may be shifted by raising them in an enclosed room in which the artificial dawn may be started one, two, three or more hours after real dawn at the locality in question. By clock-shifting pigeons and then releasing them, one finds that the initial orientation is altered in direct proportion to the amount they are time-shifted: for example, a pigeon that is experimentally shifted six hours from the normal outdoors light-dark cycle, will choose a compass bearing 19° off the home direction. It compensates for the movement of the sun by coupling its internal circadian clock with the sun's azimuth.

Pigeons released on a cloudy day will still fly in the direction of their home upon initial release. If the bird is fitted with a device known as a Helmholtz Coil, which twists the earth's magnetic field to the right or left, one finds that the initial orientation upon release will be to the right or left of the home direction, in accordance with the direction of twisting effected by the device. Pigeons are also disorientated when released over areas known to have magnetic anomalies. Radio-tracked pigeons fly in disorientated tracks over magnetic anomalies, but they straighten out and head for home once they leave those areas. The experiments used to prove these points demonstrate that the pigeons also use the earth's magnetic field in finding their compass bearing. On a sunny day pigeons use the sun and ignore the magnetic compass, irrespective of whether the field is anomalous, twisted or unmanipulated. This indicates that the sun is the preferred orientation device.

Scientists have found magnetic material spread uniformly throughout the pigeon's whole skull, but also concentrations of black iron-rich magnetic material embedded in muscle fibres in the pigeon's neck. It has been suggested that the torque exerted

on the grain ensemble of magnetite may activate muscle receptors sensitive to pressure and stretch, and thus form an effective basis for detection of changes in the earth's magnetic field.

Many experiments have been performed to deduce the nature of the map used by pigeons in homing. Some have demonstrated the use of landmarks, but others have shown that the pigeons do not really need landmarks for homing. Some workers have suggested the use of a mosaic map of infrasound frequencies emanating from the earth's surface. Italian scientists first demonstrated that pigeons may also use an olfactory map to find home: they form a mosaic map of their surroundings by memorizing diverse odours coming from different directions, associating one scent with one direction and a different scent with another; the map is extended as they explore areas beyond their loft. Anosmic pigeons, those unable to smell, had problems homing. German scientists, raising pigeons in enclosed lofts typical of those in "cold" Germany, could not repeat the Italian results. However, when the scientists hatched and raised their pigeons in open lofts typical of those in "warm" Mediterranean Italy, they found that pigeons could indeed use olfactory cues, after all. Thus, the differences in the early results between Italian and German experiments were not due to using different pigeon strains, but to different experimental conditions: juvenile pigeons learn to construct an olfactory map as the winds waft odours to their loft, but enclosed lofts prevented them from doing so.

Despite all the remarkable discoveries, some of which have been outlined above, the nature of the pigeon's map is still far from being clearly understood. For example, how could a pigeon released in England find its way home to Brazil having no prior knowledge of all the landmarks and olfactory cues between the two sites? Deciphering the nature of this map is one of the really exciting challenges in present-day biology.

In the USA, C. O. Whitman's detailed studies on the behaviour of pigeons led to his discovery of the principle of homology of behaviour: dispositions to perform certain forms of behaviour are shared by related pigeon species. Behaviour is controlled by genes, as are morphological traits, and likewise it is heritable. Thus, one ancestral behaviour pattern may be modified by mutations to give rise to related behaviour. O. Heinroth in Germany independently discovered behavioural homology in his studies of ducks.



The Rock Dove is the ancestor of the feral pigeon and almost all domesticated pigeons used by man for food, communications and racing, or as fancy varieties for show. Its fecundity and early breeding, together with its fast flight and colonial nesting, may have favoured its adoption in this role. Although it is one of the most widespread of all pigeons (even without including its feral form), as a species it is genetically endangered in some areas because of interbreeding with feral birds which join their wild cousins at the cliff colonies.

[*Columba livia gaddi*,
Kavir Desert, Iran.
Photo: Gertrud &
Helmut Denzau]

One of the main threats looming over some pigeon species is hunting, often illegal, and it was this that brought the Christmas Imperial-pigeon to the brink of extinction in 1940. However, the species is now widespread and common thanks to the inclusion of most of its habitat in the Christmas Island National Park. Today there are probably in excess of 1000 individuals, and, although much of the primary forest has been cleared, the species readily takes the fruits of some introduced trees.

[*Ducula whartoni*,
Christmas Island
(Indian Ocean).
Photo: Jean-Paul Ferrero/
Auscape]



Finally, it may also be worth highlighting the prominent role that pigeons played in shaping Darwin's theory of evolution. Darwin mentioned domestic pigeons three times in his writings: once in his *Origin of Species*, again in his *Sexual Selection and the Descent of Man*, and notably in his great treatise on domestication in plants and animals. Darwin did not have access to Mendel's writings and therefore was in the dark as to how traits were passed on. However, he saw domestication as a process analogous to speciation, and used domestic pigeons as subjects to demonstrate the power of selection.

In the speciation process, natural selection operates on an isolated population to select for, or eliminate, certain traits. In the domestication process, humans isolate a population and breed for specific characters. Darwin noted that all domestic pigeon breeds were descended from one ancestor, namely the Rock Dove. He further noted that since antiquity humans have selected pigeons for certain shapes, sizes, peculiarities of bill shape, plumage characters and distinct voice qualities. In his opinion some of these domestic breeds differed from each other to the same degree as most natural genera of pigeons differed from each other. In re-examining the domestic breeds that Darwin studied, as well as others not available to him, one notes that many of their morphological and behavioural traits are repeated in modern pigeon species. These observed parallels are a good illustration of how natural selection has operated on pigeon genes during the speciation process.

Some domestic pigeon breeds like Scanderoon and Runts have proportionately longer bills than their Rock Dove ancestor; an especially long bill is to be found in the New Guinea Bronzewing. Domestic breeds known as Owls or Blondinettes have very short bills; no extant pigeon species has a bill as short as in these two breeds, but the Thick-billed Green-pigeon (*Treron curvirostra*) has a shorter and stubbier bill than its congeners, indicating that nature may select for small as well as large bill size in pigeons. The Dragoon breed has a swollen nasal cere that is carunculated, somewhat reminiscent of cauliflower; several extant pigeon species have hypertrophied nasal ceres, for instance the Carunculated Fruit-dove (*Ptilinopus granulifrons*) and the Nicobar Pigeon. One domestic breed, known as the Barb, has a hypertrophied eye-ring, and similar formations may be found in a number of extant species, including the Bare-eyed Pigeon of South America and the Speckled Pigeon of Africa. The bare or-

bital skin is generally blue-grey in the Rock Dove, though in one race, *gymnocyclus*, it is red. Orbital skin colour is highly variable in domestic breeds: it is blue in the Demacene, bright red in the Barb, and white or plum in other breeds. Colour of the orbital skin is considerably more variable among the many pigeon species, ranging, for example, from blue in the White-winged Dove, through yellow or orange in the Bare-faced Ground-dove, to white in the White-crowned Pigeon. Again, iris colour is dark red in the Rock Dove, while in domestic breeds it comes in many colours, and one Chinese breed, the Tung Koon Pak, has actually been bred for different iris colours, ranging from blood red to blue, purple or gold. The irides of wild Columbidae come in even more colours than domestic pigeon breeds: for example, they are blue in the Blue-eyed Dove, red in the European Turtle-dove and olive green in the Black-naped Fruit-dove.

An extant breed known as the Valencian Giant weighs up to 2286 g, more than five times the weight of the ancestral Rock Dove. Extant pigeon species range from the 30 g Common Ground-dove to the 2000 g Victoria Crowned-pigeon, indicating that directional selection for size has operated both in nature and in captivity. Several pigeon breeds have feathered crests emerging from the occipital region including the Russian Highflier, Archangel and American Crest. Occipital crests may be found in unrelated lines of extant pigeon species like the Crested Quail-dove, Thick-billed Ground-pigeon and Crested Cuckoo-dove (*Reinwardtoena crassirostris*). The ancestral Rock Dove possesses 12 tail feathers, but the domesticated Fantail breed has anything from 32 to 42 tail feathers, and the Java Fantail has 18 to 24. The crowned-pigeons of New Guinea have 16 rectrices, and the Pheasant Pigeon has 20 or 22, and are thus convergent in this respect with the Java Fantail. The tarsi of the Rock Dove are bare, but a number of extant breeds have feathered tarsi including the Lahore of India and the Shack Kee of China, a feature shared with fruit-pigeons of the genera *Ptilinopus* and *Drepanoptila*.

The ancestral Rock Dove is blue-grey all over, with two black bands across each wing and purplish green iridescence on the neck and upper breast, but in domestic breeds humans have selected for diverse colours. Remarkably, several colour patterns characteristic of certain breeds are to be found in living pigeon species. Darwin himself pointed out that some domestic breeds were coloured like the Snow Pigeon: the Prachen Kranik, Florentine and Gazzi Modena all show colour patterns similar to

that species. In a breed known as the White-tail, the iridescence of the patch on the throat and breast is extended all over the pigeon, except for the immaculate white tail, a pattern of coloration very similar to that of the Nicobar Pigeon. The domestic breed known as the Spot has a white forehead blaze, a feature found in Stephan's Dove, while the dark-backed, white-fronted pattern of the Lahore breed recalls the male Tambourine Dove. Darwin noted that, although the blue-bar morph is the common form found in Rock Doves, a morph with a pied, chequered wing pattern occurs as a rare mutation. Whitman argued that the chequer pattern is the older "ancestral" form that appears repeatedly in unrelated lines of extant pigeon species; sometimes the chequer pattern appears only in the juvenile. Darwin noted that humans have selected for sexual dichromatism in several domestic pigeon breeds: two such breeds are the Auto Sex King and Auto Sex Pioneer. He also cited a communication from A. R. Wallace, commenting on the sexual dichromatism present in various fruit-dove species. Sexual dichromatism has arisen independently in many lines of doves.

In summary, the colour patterns of various domestic pigeon breeds appear in various pigeon species, and character states such as iris colour, orbital ring colour, feathered tarsi, crests, giantism, dwarfism, hypertrophied nasal ceres, hypertrophied eye-rings, elongated or shortened bills and sexual dichromatism are to be found in various domestic breeds, and likewise in living pigeon species. While these may be many cases of convergence, as a result of random mutation, an alternative explanation is that the genes controlling expression of all these characters were present in the proto-columbid; they were "invisibly stored away" in its descendants, and were recalled from time to time by natural selection, as new species evolved. This may explain the existence of similar traits in very different lines of pigeons.

Status and Conservation

Some dove species have benefited considerably from man's presence and have increased both in range and in numbers as a result of his activities. As forests were cleared for agriculture and the raising of livestock in Australia, Crested Pigeons expanded their range, moving into the man-made savannas, where the watering areas provided for livestock were a second factor responsible for their success. The American Mourning Dove is another successful species, and many millions are shot each year with no apparent adverse effects on their overall numbers. The Orange-bellied Fruit-dove, unlike its forest-loving congeners, is a forest-edge species and thrives well in semi-open country, so it often moves into disturbed areas and may be found in the town gardens and street trees of Madang, in Papua New Guinea. Another species that prospers near humans is the Inca Dove, which often thrives in gardens and city parks.

The successful species are usually the generalists that do well in altered habitat. One of these is the Eurasian Collared-dove, which makes good use of gardens, avenues, churchyards, farmyards and orchards amongst many other sites, and in parts of its range may nest on buildings, sometimes under roofs. Its original home was southern Asia, where it is a resident species, although montane populations do make altitudinal migrations to lower elevations in November, returning uphill again in March. Marked expansion of the species from the south-east toward the north-west was first detected in the 1930's. The first breeding records for Italy were in 1947, for France in 1952 and Britain in 1955. The species reached as far west as the Faeroes and Iceland in the 1970's and is now spreading in the direction of the former USSR. It first bred in Portugal in 1974, while in 1979 the first individuals were seen in Suez, Egypt, whence they then spread to Cairo and environs. The reason for this dove's success as a colonizer is still unclear. Some have suggested genetic mutation as a factor, whereas others pointed to its changing from being mainly a tree-nester to nesting on buildings. Some have suggested that lessened predation in urban and suburban habitats has contributed to its success, while it also raises more broods per year in temperate regions. Undoubtedly, the answer must lie in a combination of these factors.

Perhaps the best known of all human commensals is the feral pigeon, the domesticated Rock Dove returned to the wild. Feral pigeons that have recently escaped are often larger and more heavily built than their wild ancestors, but North American populations are morphometrically similar to their European ancestors, a product of only 300 years of natural selection. Moreover, morphometrics of females based on various skeletal measurements indicate that even in this short time a north-south size cline has arisen, with larger individuals in more northerly latitudes, a manifestation of Bergman's Rule. Pure or relatively pure Rock Doves still exist in the Outer Hebrides and Shetlands off Scotland, and on the coastal cliffs of Sardinia and various parts of North Africa, Iran, Afghanistan, Kashmir and south-west China. Tragically, ferals are interbreeding with Rock Doves in many areas, such as in parts of Sardinia, and if no steps are taken the ancestral Rock Dove may disappear as early as the twenty-first century, swamped out by genes of interbreeding ferals. Intact gene pools of Rock Dove populations in the Outer Hebrides, Sardinia and elsewhere in the Mediterranean may be preserved by removing all adjacent populations of feral pigeons, but this would have to be followed up by periodical inspections for ferals in buffer zones surrounding the Rock Dove colonies.

In a survey conducted in 1985, it was noted that some 200 of the 217 species or races of birds known to have become extinct in the last 400 years were island forms. Moreover, two-thirds of the world's threatened bird species live on islands. Among pigeons, nine of the ten species known to have become extinct within the last two centuries were insular forms, the Passenger Pigeon being the only continental form extirpated in the wild during the period.

The most spectacular losses from the order Columbiformes must surely have been the Dodo and the two solitaires (see Systematics). The Dodo is known from bones, bits of skin, two feet and two heads, and numerous illustrations. It was immortalized by Sir John Tenniel's drawings in Lewis Carroll's *Alice in Wonderland*. The Rodrigues Solitaire or "White Dodo" is known from paintings and skeletons taken from caves, while the Reunion Solitaire is inferred from accounts of explorers and paintings, as no specimens have survived. The Dodo disappeared soon after 1680, the Rodrigues Solitaire somewhere between 1790 and 1800, and the Reunion Solitaire about 1750. All three were flightless and thus fell easy prey to mariners who hunted them for food. Introduced rats, monkeys, cats and pigs preyed on their eggs and presumably their young and thus also contributed to their demise.

Extinctions actually within the Columbidae include the Mauritius Blue-pigeon (*Alectroenas nitidissima*), which disappeared around 1830; the Bonin Pigeon (*Columba versicolor*) last recorded in 1889; and the Ryukyu Woodpigeon (*Columba jouyi*), last seen in 1936. Several other species may well be extinct, although they have not yet been definitively crossed off the lists of living species. These include the Choiseul Pigeon, last seen in 1904, and the Red-moustached Fruit-dove (*Ptilinopus mercierii*), probably extinct since the 1920's, despite a claimed sighting in 1980; sadly, other candidates are queuing up, for example the Thick-billed Ground-dove (*Gallicolumba salamonis*), not observed since 1927, although its retiring disposition may offer more hope. The Socorro Dove is extinct on its native island, but survives as captive populations, which may yet be the basis of its return. In addition, at least two insular subspecies have gone extinct, namely the Norfolk Island form of the New Zealand Pigeon (*Hemiphaga novaeseelandiae spadicea*) and the Lord Howe Pigeon (*Columba vitiensis godmani*).

Some doves have become extinct on some islands but still persist in others. For example, the Mariana Fruit-dove (*Ptilinopus roseicapilla*) has been extirpated by brown tree snakes (*Boiga irregularis*) on Guam, but still exists on other islands of the Northern Marianas. The Sao Tome Olive-pigeon (*Columba thomensis*) is extinct on the Ilha de Rolas, "Pigeon Island", but still thrives on São Tomé itself, where it is threatened by hunting pressure. The beautiful Blue-headed Quail-dove is extinct on the Isle of Pines, but persists in Cuba, where it is Endangered due to hunting and habitat destruction.

Some 58 of the 309 species of pigeons, or 19%, are currently listed as threatened, and it is worth noting that 47 of these 58, or 81%, are insular forms. After the aforementioned cases of the



For terrestrial birds on small islands one of the greatest dangers comes from introduced predators, especially rats and cats. The Polynesian Ground-dove has been exterminated by these pests on many of the islands it once inhabited in French Polynesia, and perhaps over a wider range in the more distant past. It has now vanished from Tahiti and neighbouring Moorea, in the Society Islands, and from at least nine other islands in the Tuamotu Group. Many other islands where it has been recorded have not been surveyed since the 1920's, although numerous small atolls have never been visited by ornithologists. The fact that a previously unknown population was discovered in 1990/91 on two forested islets in Rangiroa Atoll gives some grounds for optimism.

The only long-term remedy in such cases is eradication of rats and cats and any other non-native predators from the islands, followed by a reintroduction programme. The Polynesian Ground-dove is currently classed as Critically Endangered.

[*Gallicolumba erythroptera*,

Tuamotu Archipelago.

Photo: Roland Seitre/Bios]



Choiseul Pigeon, Red-moustached Fruit-dove and Socorro Dove that actually touch on extinction, the next most serious threat category is that of Critically Endangered, which is applied to species that were judged in 1994 to have a 50% chance of going extinct within five years: no fewer than 12 dove species are thus listed, including ten insular forms. All together 15 species, very nearly 5% of all pigeon species still listed as extant, are thus classified as Critically Endangered or worse, an alarming prospect.

Amongst the most gravely threatened doves is the Marquesas Imperial-pigeon, of which only 150-300 individuals were reckoned to survive in 1993. This species has been brought to the brink of extinction by severe habitat degradation by introduced herbivores, combined with a significant level of illegal hunting. Another species with a desperate plight is the Negros Fruit-dove (*Ptilinopus arcanus*), of which only a single specimen exists; indeed, it is so poorly known that its validity as a species remains somewhat uncertain. This form has only once been sighted in the field, in 1953, and, despite intensive surveys during the 1990's, it continues to give no signs of life. As hunting and habitat destruction have been very extensive around Mount Canlaon, the only site known for this form, it seems very likely that it has already been lost. The Polynesian Ground-dove (*Gallicolumba erythroptera*) is another species judged to be Critically Endangered, as it is known to have disappeared from most of the few islands on which it has ever been recorded, largely as a consequence of the introduction of rats and cats. As recent surveys in the zone have been few, and several islands that might hold populations await investigation, there is still hope for this species, but the fact that this merely amounts to absence of some negative evidence does not admit room for undue optimism at this stage.

One of the relatively much fewer continental species on the threatened list is the Veracruz Quail-dove (*Geotrygon carrikeri*), a rare form endemic to cloud forest. It is found only at two sites in the Tuxtla region of south-east Veracruz, Mexico, where its survival is threatened by habitat loss. The Plain Pigeon and Blue-headed Quail-dove are threatened both by hunting and habitat alteration, while introduced predators and destruction of habitat

have led to the near demise of the Grenada Dove. The Marquesas Ground-dove is to be found in scrubby vegetation on only two cat-free islets, as these predators have extirpated it from all the other islands in its original range. Habitat destruction, hunting and predator pressure have again combined to cause reduction in the populations of other threatened forms, notably the Mindoro (*Ducula mindorensis*) and Chestnut-bellied Imperial-pigeons (*Ducula brenchleyi*).

Excessive hunting, habitat loss and introduced predators are responsible for the sorry plight of most threatened pigeons, in conjunction in some cases with the effects of cyclones. For example, the extraordinary Tooth-billed Pigeon was once avidly hunted, although it is now fully protected. Cyclones that ravaged Samoa in 1990 and 1991 reduced canopy cover from 100% to 27%, and these natural disasters, together with the fact that this dove does not adapt to logged areas that have been replanted with exotic species, have contributed to its present rarity. It is now to be encountered only locally in highland forests between 900 and 1400 m. Another case of note is that of the three species endemic to islands of Macaronesia, the Dark-tailed (*Columba bollii*) and White-tailed Laurel-pigeons (*Columba junoniae*) of the Canary Islands, and the Madeira Laurel-pigeon (*Columba trocaz*) of Madeira. All three are considered threatened, with habitat loss having played an important part. In the first two species, hunting and introduced predators are also considered to be significant factors, and both are now rated as Vulnerable. The Madeira Laurel-pigeon, however, may be on the slow road to recovery as a consequence of conservation actions taken, but its still precarious situation means that it is classed as Conservation Dependent, meaning that without the active conservation measures it would surely revert to threatened status.

The numbers of species listed as threatened should probably be considered underestimates, as we know little about a great many species in the wild. For example, the Maroon-chested Ground-dove (*Claravis mondetoura*), a species not threatened throughout most of its extensive range, was thought to be extinct in Costa Rica, but, happily, several individuals were sighted in the Talamanca Mountains when the bamboo forests bloomed in 1991 and 1992. The status of this secretive species is difficult to determine as we know nothing about its movements and occurrence when bamboos are not blooming, and similar stories can be told about several other shy species, especially those that live on the floor of dense forest. One such case is that of the Black Cuckoo-dove (*Turacoena modesta*), which occurs on only two islands in the Lesser Sundas: during a nine-week survey of the suitable habitat that remains on Timor the species was seen at only two sites, for its habitat has been severely depleted, but it was recorded in an extensive area of forest on Wetar during a brief visit in 1990, the first to that island by an ornithologist in almost 80 years. Deforestation is probably causing the decline of several quail-doves, including the White-faced, Costa Rican, Purplish-backed (*Geotrygon lawrencii*) and Lined Quail-doves (*Geotrygon linearis*), but data that are essential to a proper assessment of their current status are decidedly lacking.

Island forms are sometimes exceptionally tame and easily preyed upon by humans or other introduced mammals, and several species have been hunted to extinction. The Dodo, for instance, was flightless as well as being tame: it was extirpated by settlers and visiting sailors seeking meat for the table. The Socorro Dove, now extinct on its home island, was also fearless of humans: one investigator reported walking up to one and stroking its toes. The published literature and our interviews of mariners who had lived on Socorro in the 1950's reveal that the doves were easily killed with sticks and stones. Human predation was probably an important factor leading to their demise.

The distinct Clarion Island race *clarionensis* of the American Mourning Dove is also notably tame, and one was seen to approach an investigator, stopping a few centimetres from his boot to examine his shoelaces. Accounts from sailors indicate that in the past this dove was periodically hunted with sticks or stones. In islands of the south-west Pacific, the Metallic Pigeon (*Columba vitiensis*) is normally a wary species, typically flying high above the observer, but birds of the extinct Lord Howe Island race *godmani* were described in 1788 by one visitor as "large

The Socorro Dove, endemic to the island of that name off west Mexico, probably became extinct there in the 1970's, but it survives in reasonable numbers in zoos and collections. In its native surroundings, this highly terrestrial bird was common in woodland, feeding primarily on fruits. The vegetation cover necessary for its survival was destroyed by introduced sheep, a situation exacerbated by feral cats. However, once cat-eradication and tree-planting programmes have been completed, release back onto Socorro of this and three other endemic species is planned for the late 1990's.

[*Zenaida graysoni*, San Diego Zoo, California, USA.
Photo: Kenneth W. Fink]

fat pigeons...sitting on low bushes and so insensible to fear, as to be knocked down with little trouble." Nevertheless, by the time the naturalist W. MacGillivray visited the island in 1853, he found that the pigeon had been extirpated.

The Passenger Pigeon was one of the most tragic casualties of human folly. Migrating Passenger Pigeons passed in such numbers that they "darkened the sky" and the "weight of their numbers broke great branches from trees". In about 1810 Alexander Wilson estimated as many as 2,230,272,000 pigeons in a flock, and as late as 1871 a concentration of 136,000,000 pigeons bred in an area of 850 square miles (c. 2200 km²) in Wisconsin. The last Passenger Pigeons recorded in the wild were seen in 1899, and the last individual died in captivity in 1914.

Although this species was heavily exploited (see Relationship with Man), hunting pressure itself does not appear to have been the main cause of its extirpation. The species was a specialist on mast crops, beechnuts, chestnuts and acorns, and was dependent on these as its main sources of food. Good mast crops were irregular in space and time; depending on the species, bumper crops were produced every two to five years. There was some mast produced each year, but in scattered patches that had to be located. The Passenger Pigeon evolved into a nomadic species, combing the eastern forests each year for good forest patches. Nesting grounds were selected based on the presence of good mast production, and good mast years triggered high nesting productivity. Location of mast patches required many pairs of eyes, and large flocks with their many "scouts" were more apt to find good areas, as they flew in open-front flocks adapted for scanning large areas of the landscape. Flocks wheeled about in circles when they located a rich crop. They then landed and gave forth a specific call to attract others to share in the largess.

The extinction of the Passenger Pigeon was apparently due to two related factors: first, the destruction of large areas of eastern forest meant fewer patches yielding mast each year; and, second, hunting and other mortality factors reduced flock sizes to a limit below which detection of rich areas became increasingly difficult, so that the remaining birds could fly by and miss good spots, with the result that they either starved or at least could not reproduce. Soon fledging rates no longer compensated for death rates, and over a surprisingly brief period the remaining populations declined to zero.

As already noted, several pigeon species have been driven to extinction over the last one or two centuries. However, archaeologists have recently uncovered evidence of numerous extinctions and extirpations of avian species which occurred much earlier. Between the first arrival of Polynesians in the Pacific some 3000 years ago and that of Europeans about 200 years ago, birds were hunted by early Polynesians for food, feathers and bones, which undoubtedly spurred on numerous extinctions. Some of these extinctions were of spectacular pigeons, including a congener of the Nicobar Pigeon, the imperial-pigeon *Ducula david*, and the ground dove *Gallicolumba nui*, all larger than any living congeners. Bones of an unknown congener of the Tooth-billed Pigeon and of an imperial-pigeon as large as today's crowned-pigeons were collected on the island of Anatu. This work has also revealed that some surviving endemic species including the Polynesian Ground-dove and Polynesian Imperial-pigeon (*Ducula aurorae*) were once more widespread. Indeed, the Nuku Hiva Imperial-pigeon (*Ducula galeata*), now known only from Nuku Hiva in the Marquesas, once had a range covering thousands of kilometres.

It is clear that the single most important factor leading to depression of avian populations is habitat destruction, usually attributable to humans but sometimes to natural causes such as hurricanes. This probably already occurred in prehistoric times, when people burnt large tracts of forests throughout the Pacific islands in order to plant yams, taro and other aroids, coconuts, bananas and other crops. Elsewhere, on its island home the Grenada Dove is now restricted to two remnant forest patches, as a consequence of logging; one of these patches is scheduled to be logged soon. Specialist dove species are amongst the most vulnerable and most susceptible to changes. For example, the bamboo specialist, the Purple-winged Ground-dove (*Claravis godefrida*) was once locally abundant, and early naturalists reported seeing flocks of hundreds gathering at bamboo blooms. With the large-scale clearing of bamboo this species has become one of the rarest and most seriously threatened doves in our day; it is now amongst those classed as Critically Endangered.

Habitat alteration may sometimes be mediated by intense grazing from domestic or feral livestock. Australians introduced sheep to Socorro Island (off western Mexico) in the 1840's, as a source of meat for any passing ship, but once regular harvesting



The unobtrusive and formerly abundant Purple-winged Ground-dove apparently specializes on the seeds of bamboo. Clearance and fragmentation of its habitat have been widespread, meaning that increased distances and time intervals between the flowering of bamboo stands make it difficult for the bird to find enough of its favoured food. It was last seen in Brazil in 1991 and in Argentina in 1977. An additional threat is that this ground-dove was a popular cage-bird; rarity can be an incentive to trappers since prices rise correspondingly.

[*Claravis godefrida*.
Photo: Luiz Claudio Marigo]

by sailors ceased, the sheep multiplied into enormous flocks. Intensive grazing has destroyed large tracts of forest on Socorro's southern slope, while the heavy ground cover typical of the "virgin" northern part of the island was cropped to nothing. Erosion set in and exposed tree roots: entire copses of trees soon died and rotted away, reducing huge areas to barren red dust. Not only was the Socorro Dove's habitat altered and markedly reduced, but also cats were introduced in the late 1960's. Between hunting by island residents and cat predation on the inordinately tame Socorro Doves, the species stood no chance of survival, and became extinct in the wild by the late 1970's.

Hunting has a particularly adverse effect in cases where species are restricted to small areas, or if their populations are already depressed. Pigeons, along with parrots and rails, were the main food items in eastern Polynesia. Indigenous peoples practised ritualized hunting of pigeons until after European contact, and pigeon meat is still relished today in the more traditional parts of Polynesia and Melanesia. Humans must have visited virtually every island in eastern Polynesia over the past two millennia. Almost every small, low island supported at least one pigeon species at one time, but these birds were easily located simply because these islands were small. The end result was the decline of many doves, either extirpated or reduced to relict populations on one to a few islands. These remnant populations have been called "pseudo-endemics".

What are the solutions? Habitat preservation is obviously the main answer. For example, the White-winged Dove breeds principally in arid scrubland in Texas and Mexico: in 1924, 4,000,000-12,000,000 White-winged Doves could be seen in autumn migration through the lower Rio Grande in Texas, but beginning in 1924 large tracts of breeding habitat were destroyed, and by autumn 1939 numbers of White-winged Doves had plummeted to an estimated 500,000-600,000 birds. Between 1953 and 1981, 1,100,000 hectares of scrubland were cleared for agriculture, and by 1965 altogether 95% of the dove's natural habitat had been destroyed. Recommendations were made and implemented by the government to purchase 4000 hectares of scrubland to be preserved as refuges for the dove. Unexpectedly, some 28,000 hectares of citrus groves established since the 1930's provided a new breeding habitat for this dove, and by the 1980's some 8500 hectares of brushland were utilized by White-winged Doves in Texas. The dove population stabilized to about 530,000 breeding individuals.

However, there were signs that White-winged Dove populations were continuing to decline, and several birds were

found dead of unknown causes. This prompted studies in the Rio Grande Valley of Texas, and these have revealed that the doves tend to drink water of irrigated cotton fields contaminated with organophosphorus pesticides. The ingested pesticides make their way to the brain, where they inhibit brain cholinesterase activity. Some 39% of White-winged Doves sampled in 1992 were diagnosed to have been contaminated with anticholinesterase compounds. In 1991, when pesticide use was increased in response to an outbreak of sweet potato white-fly (*Bemisia tabaci*), 79% of doves collected were found to be suffering from exposure. The effects of sublethal doses of these pesticides on productivity of White-winged Doves is still unknown, but since these compounds have been known to cause mortality of large numbers of birds of various species, investigators have urged that continued studies of this problem be given the highest priority.

Captive breeding may prove a valuable supplement to habitat restoration and preservation. Pigeons and doves are easily maintained in captivity and thus make good subjects for such programmes. The word "supplement" must be stressed because if the habitat is not prepared to receive the birds, release of captive-bred individuals will be a waste of time. For example, several North American zoos have initiated a co-operative breeding-release programme for the Mariana Fruit-dove, now extinct on Guam. However, release of fruit-doves would be a complete waste of time, effort and money as long as tree snakes remain on the island. A captive-release breeding programme for the Socorro Dove has been initiated by Frankfurt and Cologne Zoos and by the Island Endemics Institute in California, in co-operation with private aviculturalists. Nevertheless, release of doves on Socorro would be useless unless all the cats are first removed. Mexican biologists and the Mexican navy, which administers this federally owned island, have now begun an intensive cat-eradication programme.

A breeding programme for the Puerto Rican Plain Pigeon is also under way. As Plain Pigeons have not proved good parents in confinement, eggs are incubated and raised by domestic African Collared-doves. Some Plain Pigeon squabs are hand-raised and fed on pigeon milk extracted from the crops of squabs of the giant Runt domestic pigeon breed. As could have been predicted, use of pigeon milk with its unknown "growth factor" (see Breeding) in the hand-raising programme has improved fledging success of Plain Pigeons considerably.

The breeding-release programme for the Pink Pigeon indicates that such a programme can be successful. Captive-bred Pink



The Dark-tailed Laurel-pigeon occupies lower montane laurel forest in the Canary Islands. The effects of extensive clearance of this habitat to make way for plantations have been compounded by hunting and introduced predators. There are probably around 1700 individuals remaining, spread over four islands. In order to secure the future of the species it is essential that the regulations within protected areas are strictly enforced.

[*Columba bollii*, Los Realejos, Tenerife, Canary Islands. Photo: Nicolás Martín Jorge]

The Henderson Fruit-dove is a prime example of a species that is intrinsically at high risk: confined to a small, remote island and with a specialized frugivorous diet, if its habitat were to be degraded in some way or a potential predator admitted to the island, the dove could rapidly find itself facing imminent extinction. At present, Henderson Island holds roughly 3000-4000 birds.

[*Ptilinopus insularis*,
Henderson Island,
Pitcairn Group.

Photo: Phil Chapman/
BBC Natural History Unit]



Pigeons were released on Mauritius and their fates followed with small radio transmitters. Some pigeons were shown to adapt well to living on their own in the wild, but because predators took a large portion of released birds during the early release attempts, investigators targeted other small islands free of predation as alternative release sites. In fact, the island of Reunion which is free of introduced mongooses and monkeys was contemplated as a release site, and indeed it was once home to an extinct congener, *Nesoenas duboisi*. Since the initial problems, the picture has turned rosier, and 51 captive-bred Pink Pigeons were released between 1987 and 1992 at Brise Fer, Mauritius. Supplementary feeding and control of rats at this locality and at the *Cryptomeria* grove where a small group of wild birds lived caused a dramatic increase in survival and breeding success in both populations. By September 1993 the introduced population numbered 28, and by May 1994 numbers had increased to 52, half of the birds having hatched in the wild, while the original wild population in the *Cryptomeria* grove numbered about 25. The release programme is now being extended to include a predator-free island and to a lowland site, with the goal of establishing a free-living population of at least 200 Pink Pigeons.

What appears to be a promising conservation measure for threatened pigeons in the South Pacific involves their reintroduction by means of translocation to predator-free islands that they formerly occupied, and which are now free from human activity. Given the highly restricted current ranges of some Polynesian species, it would seem appropriate that, on the basis of information supplied by archaeologists as to former ranges, biologists could go in and study habitat quality and document absence of predators; release islands should ideally be free of humans as well. It has been proposed that the Rarotonga Fruit-dove (*Ptilinopus rarotongensis*) now endemic to the islands of Rarotonga and Atiu in the Cook Archipelago, and now numbering perhaps fewer than 100 individuals, could be translocated to the islands of Ma'uka and Mangaia, where they once occurred. Similar programmes could be implemented for the relict populations of the Polynesian Ground-dove, Nuku Hiva Imperial-pigeon and Polynesian Imperial-pigeon, which are now known once to have been widespread in the Pacific.

Preservation of habitat and its wildlife requires a state of mind disposed to accept all the implications, not merely those that are

convenient. A positive attitude towards the conservation of biodiversity may be generated and enhanced by the education of local children, who will be the future citizens and leaders of the world. That this can be immensely effective has been ably demonstrated in programmes, targeted mainly at school children in the Caribbean, aimed at preserving the threatened parrot species of the zone. These have promoted awareness in people throughout the Caribbean, from children all the way up to the governmental level, as to the importance of saving these birds as parts of their natural heritage, and at the same time protecting the habitats in which they survive. Such programmes could and should be implemented to save the threatened pigeons of the world, so that posterity may continue, with Alfred Lord Tennyson, to thrill to their peaceful "murmuring in immemorial elms", and to their often spectacular displays.

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ssp targia

ssp intermedia

pale form

ssp gymnocyclus

dark form

ssp dakhlae

ssp livia

ssp guinea

ssp phaeonotus

ssp azorica

ssp iranica

ssp palumbus

ssp casiotis

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Subfamily COLUMBINAE

Genus *COLUMBA* Linnaeus, 1758

1. Rock Dove

Columba livia

French: Pigeon biset **German:** Felsentaube **Spanish:** Paloma Bravía
Other common names: Rock Pigeon; feral pigeon (feral form)

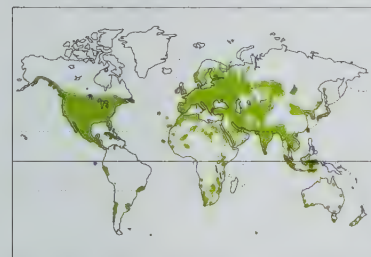
Taxonomy. *Columba (domestica) β livia* J. F. Gmelin, 1789, southern Europe. Ancestor of feral pigeon. Closely related to *C. rupestris* of C Asia and *C. leuconota* of Himalayas. Race *nigricans* may refer to feral birds, and thus be invalid. Considerable confusion as to the degree to which several populations are "natural", and how much they have been affected by mixing with feral birds. Thirteen subspecies recognized.

Subspecies and Distribution.

- C. l. livia* J. F. Gmelin, 1789 - British Is and W Mediterranean through Dalmatia and N Libya E to Urals, Caucasus and W Siberia.
- C. l. atlantis* Bannerman, 1931 - Madeira, Azores and Cape Verde Is.
- C. l. canariensis* Bannerman, 1914 - Canary Is and islands off Morocco.
- C. l. gymnocyclus* G. R. Gray, 1856 - Mauritania, Mali and Ghana, and coastal Senegambia and Guinea.
- C. l. targia* Geyr von Schweppenburg, 1916 - C Sahara to C Sudan.
- C. l. dakhlae* R. Meinertzhagen, 1928 - Dakhla and Kharga Oases.
- C. l. butleri* R. Meinertzhagen, 1921 - Gebeit, Red Sea Province and Egyptian Sudan.
- C. l. schimperi* Bonaparte, 1854 - Nile valley to Khartoum; Red Sea hills from E Egypt to N Eritrea.
- C. l. palaestinae* Zedlitz, 1912 - Palestine, Sinai and Arabia S to Aden and Masqat.
- C. l. gaddi* Zarudny & Loudon, 1906 - Azerbaijan, Iran, W & N Afghanistan, Turkmeniya, Ustyurt Plateau in Transcaspia and Uzbekistan.
- C. l. neglecta* Hume, 1873 - Transcaspia and Turkestan S to Iran, Baluchistan, Sind and NW Punjab, and E to Tien Shan and SW Tibet.
- C. l. intermedia* Strickland, 1844 - India and Sri Lanka.
- C. l. nigricans* Buturlin, 1908 - Mongolia and N China in Shanxi, Jilin and Gansu.

Introduced and feral populations almost worldwide.

Descriptive notes. Male 31-34 cm; 180-355 g. General colour bluish grey, darkest on head and rump, palest on wing-coverts; two black bars conspicuous on folded wing; black terminal band on tail; outer edge of two outermost rectrices white on basal halves; underwing and lower back white, latter sharply separated from dark grey rump; neck and upper breast suffused with purple and green iridescence, with each feather bifurcated; iris varies from golden orange to orange to red-orange; orbital skin blue-grey; bill black, cere white; legs red or purplish red. Female slightly duller grey with less neck iridescence. Juvenile duller still, with dull eyes and feet; some



iridescence on each side of neck in male but not female. Race *atlantis* is a chequered form, probably of domestic origin; *canariensis* smaller and darker than nominate; *gymnocyclus* typically very dark, with extensive red orbital skin and white patch on back, but some birds paler, with grey orbital skin; *targia* smaller and grey-rumped; *dakhlae* very pale; *butleri* is a paler version of *targia*; *schimperi* small and pale with lower back grey; *palaestinae* larger and darker than *schimperi*; *gaddi* like *palaestinae* but larger with paler back; *neglecta* is a darker version of nominate; *intermedia* differs in lacking white patch on back; *nigricans* variable, possibly of domestic origin. Size varies clinally, increasing latitudinally from south to north.

Habitat. Natural habitat consists usually of rock faces where birds nest. Studies in Scotland found species inhabiting ledges in caves and sea cliffs; some populations have invaded ruined buildings. In Algerian Sahara can be found at sites where rocks, some vegetation and a source of water occur together; in Tunisia, inhabits deep wells; in Israel, found on steep rocky slopes and in canyons. Avoids areas of tall and dense vegetation. Feral form is commensal with man, particularly abundant in cities.

Food and Feeding. Studies in Europe reveal that birds feed typically on grains, such as *Triticum*, *Hordeum* and *Avena*; legumes like *Pisum*, *Vicia*, *Phaseolus* and *Melilotus*, and various weeds including *Rumex*, *Polygonum*, *Chenopodium*, *Atriplex*, *Stellaria* and *Ranunculus*. Some invertebrates also taken, including moth larvae and pupae, snails and slugs. In Algerian Sahara, birds dependent on desert melon (*Coloquintus vulgaris*) as a source of food and moisture.

Breeding. Known to breed all year round in Britain and Ireland with peak breeding in Apr and minimum in Jul; season varies from region to region, in the Mediterranean Mar-Jul, in Cyprus from Mar-May. Colonial breeder, some colonies numbering up to 1000 birds. Nest consists of a cup loosely fashioned from stems, leaves, roots, driftwood, seaweed and feathers; no true lining, as is found in nests of some pigeons. Lays two eggs; up to 5 broods may be produced per year; incubation 16-19 days by both sexes, beginning with first egg; hatching asynchronous; fledging 35-37 days. May breed when 1 year old, although feral populations may breed at 6 months.

Movements. Although domestic form has been used in studies of migration and homing (see page 104), sometimes from hundreds of kilometres, natural populations are resident and sedentary. A ringing study utilizing ferals revealed that 86% of recoveries were within 90 m of ringing site; a ringing study with a wild population in Britain revealed movements of up to 8 km; exceptionally, two birds recovered 16 and 28 km away from ringing site. In some cases makes daily trips between breeding or roosting sites and feeding sites, sometimes c. 20 km away. In seasonally arid regions, may make local movements to more hospitable climes, e.g. present in coastal plains of Oman Jun/Jul to early Mar, but thereafter moves to inland wadis and hills to breed.

Status and Conservation. Not globally threatened. Evaluation of conservation status and security of "natural" populations hampered by confusion concerning degree of mixing with feral birds. Greatest threat to the species is that natural populations are interbreeding with feral pigeons in many areas (see

page 106), and pure populations are already confined to the remoter cliffs and islands, e.g. off N & W Scotland, but even here domestic pigeons often join the flocks. The same fate is likely to befall all populations in areas with human habitation of any extent in the vicinity. Studies in Israel have revealed that populations are much smaller nowadays than in historical times. CITES III in Ghana.

Bibliography. Abs (1983), Ali & Ripley (1981), Ash & Miskell (1983), Aspinall (1996a), Baumel *et al.* (1983), Berthold (1991), Braithwaite & Guilford (1995), Braithwaite & Newman (1994), Brazil (1991), Burley (1980, 1981), Burley & Moran (1979), Cramp (1985), Davies & Green (1991), Deignan (1945), Dowsett & Forbes-Watson (1993), Étchécopar & Hùe (1964, 1978), Ewins & Bazely (1995), Ferns (1992), Fisher (1957), Flint *et al.* (1984), Frith (1982), Ginn *et al.* (1989), Goodman *et al.* (1989), Grimes (1987), Haag-Wackernagel (1994), Hazevoet (1995), Herremans (1994), Higgins & Davies (1996), Howell & Webb (1995a), Hùe & Étchécopar (1970), Iolàe *et al.* (1994), Janiga (1991a, 1991b, 1992, 1994), Jennings (1995), Johnston (1992a, 1992b, 1992c, 1994, 1996), Johnston & Janiga (1995), Johnston & Johnson (1989), Johnston *et al.* (1988), Kautz (1985, 1986), Kautz & Malecki (1990), Kautz & Seumans (1992), Keeton (1972), Knystautas (1993), Kotov & Noshkov (1978), Kowalski (1994), Kreithen & Eisner (1978), Kreithen & Quine (1979), Lekagul & Round (1991), Lever (1987), Lipske (1996), Little (1994), Mackworth-Præd & Grant (1957, 1970), Maclean (1993), Matsuda (1989), Mondloch (1995), Mondloch & Timberlake (1991), Murton & Clark (1968), Murton & Westwood (1966), Murton *et al.* (1969), Nadler & Ansonge (1982), Nadler & Gebauer (1985), Paz (1987), Phelan (1987), Phillips (1978), Pomeroy & Heppner (1992), Porter *et al.* (1996), Preble & Hupner (1981), Ripley (1981), Roberts, T.J. (1991), Robichaud *et al.* (1996), Rutgers & Norris (1970), Saimi & Toor (1991), Sengupta (1974), Shirihai (1996), Simeonov *et al.* (1990), Smythies (1986), Snow (1978), Sol & Senar (1995), Stabler (1951), Taylor (1995b), Tögel & Witschko (1992), Urban *et al.* (1986), Wallraff (1993, 1994a, 1994b), Wallraff & Kiepenheuer (1994), Wallraff *et al.* (1993), Weber *et al.* (1993), Webster *et al.* (1985), Woodall (1985), Zweers (1982a, 1982b).

2. Hill Pigeon

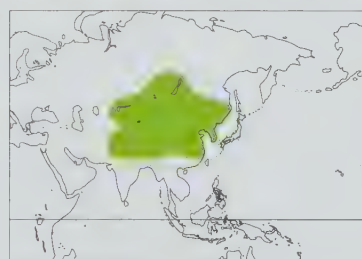
Columba rupestris

French: Pigeon des rochers **German:** Klippentaube **Spanish:** Paloma Rupestre
Other common names: Eastern/Bar-tailed/White-tailed Rock-pigeon/Rock-dove, Blue Hill-pigeon

Taxonomy. *Columba Oenas δ rupestris* Pallas, 1811, Dauria. Closely related to *C. livia* and *C. leuconota*. Two subspecies recognized.

Subspecies and Distribution.

- C. r. turkestanica* Buturlin, 1908 - Semiretschensk, Zaissen and Russian Altai S through Turkestan to Balistan (Gilgit, Yasin, Hunza and Karakoram), and E to W Tibet and N Himalayan slopes.
- C. r. rupestris* Pallas, 1811 - W Mongolia, Transbaikalia and Amurland S through Mongolia to E Tibet, W Sichuan, Helan Shan and Heilongjiang, and Korea.



Descriptive notes. 33-35 cm. Similar in appearance to nominate form of *C. livia*, but paler grey; black wingbars less extensive, and for most part narrower; white central tailband; iridescence on neck tends to be less intense, and breast often suffused with wine red below gloss. Female tends to have iridescence less intense. Juvenile browner, lacks iridescence, many feathers fringed with buff. Race *turkestanica* slightly paler, and often whitish on belly.

Habitat. Open rugged country, where lives in flocks around cliffs and gorges; in some areas, also frequents towns; 2000-5500 m in summer, but moves to lower elevations in winter.

Food and Feeding. Mainly granivorous, feeding on seeds of weeds; also takes grain, green shoots of crops, leaves and some snails. Known to follow mule trains, to feed on spilled grain or dung, and also to take votive grains scattered by pilgrims.

Breeding. Feb-Sept. Colonial breeder. Builds a nest platform of twigs and plant items placed in crags or cliffs; in C Asia and China also uses holes and niches in buildings. Lays 2 white eggs.

Movements. Sedentary. Although no long-distance migrations undertaken, in some areas, birds descend to as low as 1500 m in winter; has also been observed making daily flights to 6100 m to mountaineers' camps on Mt Everest.

Status and Conservation. Not globally threatened. In Ulan-Ude region S of L Baikal, competes with *C. livia*, which first appeared there in 1960's; present species was at that time one of commonest birds in the region. Population has decreased from c. 3500 birds in 1978 to 1000 birds in 1989. Nesting sites were abandoned to *C. livia*, whenever the latter invaded; some 3-10% of population hybridizes with latter species; hybrid frequencies appear stable, however, as ethological barriers, asynchrony in onset of breeding cycles and partial geographical site isolation prevents random mating between the two species. A detailed study at Ulan-Ude revealed that present species was an exclusively wild bird in 19th century; at beginning of 20th century started to invade towns, at first gathering in winter to forage; eventually a few solitary pairs stayed to breed; in second half of 20th century city-breeders increased considerably, so that today in region of Zabaikalie only 3-5% of the population still live in wild conditions.

Bibliography. Ali & Ripley (1981), Dorzhiev (1991), Étchécopar & Hùe (1978), Flint *et al.* (1984), Grummt (1961), Hemmingsen (1947), Hùe & Étchécopar (1970), Inskipp & Inskipp (1991), Johnston & Janiga (1995), Knystautas (1993), Kotov & Noshkov (1978), Nadler & Ansonge (1982), Nadler & Gebauer (1985), Paludan (1959), Ripley (1981, 1982), Roberts, T.J. (1991), Rogacheva (1992), Rösler (1996), Rutgers & Norris (1970), Schäfer (1938), Stepanyan (1990a), Won (1993), Yang Lan *et al.* (1995).

3. Snow Pigeon

Columba leuconota

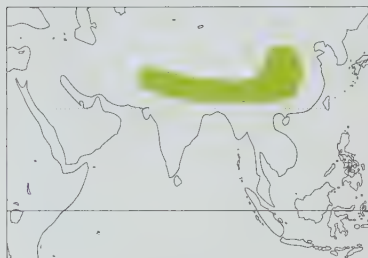
French: Pigeon des neiges **German:** Schneetaube **Spanish:** Paloma Nival
Other common names: Tibetan Dove, White-bellied Pigeon

Taxonomy. *Columba leuconota* Vigors, 1831, Himalayas (probably Nepal). Closely related to *C. livia* and *C. rupestris*. Two subspecies recognized.

Subspecies and Distribution.

- C. l. leuconota* Vigors, 1831 - Himalayas from W Afghanistan to Sikkim; in summer also occurs in Alay Mts and Pamirs in Tadzhikistan.
- C. l. gradaria* Hartert, 1916 - mountains of E Tibet and from E Nan Shan (Qinghai) to Yunnan and extreme N Myanmar.

On following pages: 4. Speckled Pigeon (*Columba guinea*); 5. White-collared Pigeon (*Columba albitorques*); 6. Stock Dove (*Columba oenas*); 7. Pale-backed Pigeon (*Columba eversmanni*); 8. Somali Pigeon (*Columba olivacea*); 9. Common Woodpigeon (*Columba palumbus*); 10. Madeira Laurel-pigeon (*Columba trocaz*); 11. Dark-tailed Laurel-pigeon (*Columba bollii*); 12. Afep Pigeon (*Columba uncinata*); 13. White-tailed Laurel-pigeon (*Columba junoniae*); 14. African Olive-pigeon (*Columba arquatrix*); 15. Cameroon Olive-pigeon (*Columba sjostedti*); 16. Sao Tome Olive-pigeon (*Columba thomensis*); 17. Comoro Olive-pigeon (*Columba pollenii*).



Descriptive notes. 31-34 cm; 255-307 g. Head dark slate grey; neck, underparts, lower back and upper rump white; mantle, scapulars and lesser wing-coverts light greyish brown, with rest of wing pale slate grey; three black bars across folded wing, sometimes a hint of a fourth bar; outer webs of primaries and primary tips black; lower rump, uppertail-coverts and tail black; broad white crescent-shaped band across tail; iris yellow or greenish yellow; bill black; legs red or pinkish red. Sexes alike. Juvenile duller than adult, plumage suffused with brown; grey and brown feathers have pale edges and white areas washed with greyish buff; eyes and legs

dark. Race *gradaria* a little larger, with more grey and less brown, and with these areas slightly paler. **Habitat.** Lives and roosts in colonies on rock cliffs and steep gorges in alpine zone and also above snow-line, with altitude range of 3000-5000 m.

Food and Feeding. Feeds mostly on seeds of herbs, bulbils of *Polygonum*, bulbs of crocus, small roots and small hard seeds; takes grain near villages in winter; ingests quartzite grit. Forages in pairs or small parties during summer; flocks in winter, with groups numbering up to 150 birds, gathering on boulder-strewn or grassy slopes, scree and edges of melting snow patches.

Breeding. May-Jul. Often breeds in large colonies. Builds a skimpy nest of sticks or matted grasses and a few feathers, shaped into a platform, placed on inaccessible ledges in cliffs or rock caves. Lays 2 eggs; incubation 17-19 days.

Movements. In winter both races move to the warmer climes of lower altitudes, occurring down to 1500 m, occasionally to as low as 750 m. Makes movements twice daily between roosts in mountains and arable fields and inhabited valleys below.

Status and Conservation. Not globally threatened. Very little precise information available, due largely to occupation of bleak, inaccessible areas in zone that has received relatively limited attention from ornithologists. Reported to be common in many areas, e.g. Great Himalayan and Nanda Devi National Parks (India); preferred habitats are amongst the least affected by human activities.

Bibliography. Ali & Ripley (1981), Bates & Lowther (1952), Davis (1946), Échécopar & Hue (1978), Flint *et al.* (1984), Fulton (1914), Hue & Échécopar (1970), Inskipp & Inskipp (1991), Knystautas (1993), Naether (1981), Newman (1911), Ripley (1982), Roberts, T.J. (1991), Rösler (1996), Rutgers & Norris (1970), Schäfer (1938), Schukurov (1988), Smythies (1986), Stepanyan (1990a), Vaurie (1965), Yang Lan *et al.* (1995).

4. Speckled Pigeon

Columba guinea

French: Pigeon roussard **German:** Guineataube **Spanish:** Paloma de Guinea
Other common names: Guinea/Hackled/Red-eyed Pigeon, African Rock-pigeon

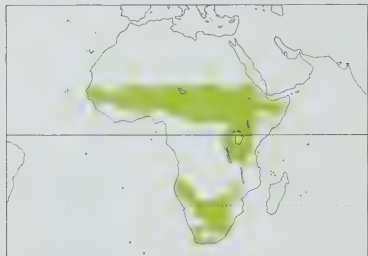
Taxonomy. *Columba guinea* Linnaeus, 1758, Senegal.

Related in some degree to both *C. livia* and *C. albitorques*. Two subspecies recognized.

Subspecies and Distribution.

C. g. guinea Linnaeus, 1758 - Senegambia E to Ethiopia and NW Somalia, S to Uganda, W Kenya and S Tanzania and N Malawi.

C. g. phaeonotus G. R. Gray, 1856 - SW Angola E to NE Zimbabwe and S to Cape Province (South Africa).



Descriptive notes. 32-35 cm; 219-390 g. Head, breast and belly bluish grey, merging to almost silver on rump; mantle and wing-coverts dark reddish purple; outer wing-coverts bluish grey and most of wing-coverts tipped with a white triangular spot, producing effect of a heavily spotted closed wing; primaries and secondaries dark slate; tail black with a pale grey central bar, two outermost rectrices with pale edges; neck collar consists of bifurcated feathers, which are chestnut basally and tipped with silvery green or silvery pink; orbital skin red or purple, with a narrow white streak dividing naked skin from grey crown; iris whitish yellow, yellow or

golden surrounded by an orange or purple outer ring; legs pink, salmon or reddish; bill black, with white cere. Sexes alike. Juvenile duller, with ill-defined wing spots; neck feathers dull and not bifurcated; feet and orbital skin greyish. Race *phaeonotus* differs in being darker in grey areas; wing spots smaller; slightly smaller in size, with a proportionately smaller bill.

Habitat. Frequents a variety of habitat types in open country, including savanna, open woodland and gardens from sea-level up to 3000 m; avoids forest. W populations are often associated with baobabs and *Borassus* palms; E and S populations may be associated with rocky terrain, cliffs and gorges; Ethiopian populations are abundant in grassland and wooded country. In some areas, species is increasingly becoming an urban bird, roosting and nesting in high densities in buildings.

Food and Feeding. Feeds mostly on seeds, taken on the ground in open fields; flocks gather after harvest to feed on maize, wheat, sorghum and other cultivated grains; also gathers on recently sown fields to consume germinating cereals; seeds of introduced grasses such as *Panicum*, *Hordeum* and wild buckwheat (*Fagopyrum esculentum*) are also relished. Known to take snails on occasion.

Breeding. Breeds in all months throughout much of range, with peak in dry season in Senegambia. Nest can be a bare scrape, or a few twigs, or an untidy but substantial platform made of twigs c. 5 mm thick and 3-29 cm long; placed on cliff, in trees or on buildings; regularly nests in tall gums, palms or other trees, near human habitation; in Senegambia nests are often lined with smaller twigs or the grass *Eleusine floccifolia*. Normally 2 eggs (1-3), and in one study in South Africa, 2 nests contained 1 egg, 266 contained 2 eggs, and 1 contained 3 eggs; incubation period varies geographically, 14-16 days in Cape Province (South Africa), 17-18 days in Ethiopia; nestling period 20-25 days; some young may fly when 20 days old. In one study at Cape Town, of 354 birds hatched, 83% fledged successfully.

Movements. May move up to 20-25 km away from roosting or breeding sites to feeding sites; some birds roost on offshore islands, e.g. Dressen I, where they make daily flights of 8-10 km to mainland feeding localities.

Status and Conservation. Not globally threatened. No precise figures available, but species frequently rather common, occurring in feeding flocks of up to 700 birds in places; abundant in Nigeria and Togo. In several areas, populations appear to be increasing, as species invades urban environments, e.g. in Nigeria, where it is expanding its range into farmland and towns; appears to adapt readily to man-altered environments. CITES III in Ghana.

Bibliography. Ash & Miskell (1983), Bannerman (1953), Britton (1980a), Clarke (1986), Cooper, J. (1975), Dowsett & Forbes-Watson (1993), Earle (1981), Elgood *et al.* (1994), Elliott & Cooper (1980), Friedmann (1930a), Ginn *et al.* (1989), Giraudoux *et al.* (1988), Goodwin (1956a, 1984), Gore (1990), Grimes (1987), Harwin (1963), Herremans (1994), Kok & Kok (1984, 1990), Lewis & Pomeroy (1989), Lippens & Wille (1976), Little (1994), Louette (1981), Mackworth-Præd & Grant (1957, 1962, 1970), Maclean (1993), Nikolaus (1987), Penry (1994), Pinto (1983), Pitwell & Goodwin (1964), Rösler (1996), Rowan (1983), Rutgers & Norris (1970), Serle (1943), Short *et al.* (1990), Shotton (1978), Skead, D.M. (1971), Snow (1978), Underhill (1995), Urban *et al.* (1986), Walker (1996), Wilson & Lewis (1977), Woodall (1973), Zimmerman *et al.* (1996).

5. White-collared Pigeon

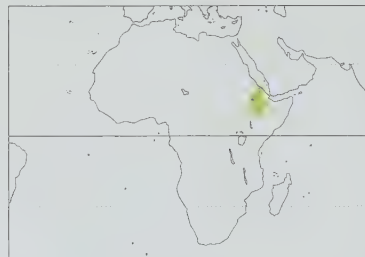
Columba albitorques

French: Pigeon à collier blanc **German:** Weißringtaube **Spanish:** Paloma Etiope
Other common names: Abyssinian (Ethiopian) Rock-pigeon

Taxonomy. *Columba albitorques* Rüppell, 1837, Taranta Mountains, Ethiopia.

Related in some degree to both *C. livia* and *C. guinea*. Monotypic.

Distribution. Highlands of Ethiopia and Eritrea.



Descriptive notes. 28-31 cm; male 292 g, female 262 g. General colour slate grey; primary coverts white, forming a patch on spread wing; secondary wing-coverts with some black chequering; tail black with an ill-defined central grey band; conspicuous white collar across back of nape; iris red or purplish red; bill black or dark grey, cere white; legs red or pinkish red. Sexes alike. Juvenile has pale edges to crown feathers, and collar lacks iridescence.

Habitat. Occupies woodland and grassland or cultivated land above 1800 m, always near cliffs, gullies, rocky outcrops or villages; has invaded cities such as Addis Ababa. Mainly found above

2400 m, and forages in fields up to 4400 m.

Food and Feeding. Feeds on various seeds, grains and on newly sown wheat.

Breeding. Breeds all year round. Nests are placed in holes in cliffs or sheltered ledges in caves or buildings. 2 creamy white eggs; in captivity, incubation 16 days, fledging 27-31 days.

Movements. Daily flights occur between low-altitude roosts and high-altitude foraging sites; when going to roost, birds sweep down the steep slopes at very high speed, estimated at 120 km/h.

Status and Conservation. Not globally threatened. Restricted range, but within this species is often abundant. Common in Addis Ababa; adaptation to living in cities and occupation of habitats at high altitudes suggest species relatively secure.

Bibliography. Boswall & Demment (1970), Brown (1965), Cheesman & Sclater (1935), Desfayes (1975), Dowsett & Forbes-Watson (1993), Friedmann (1930a), Mackworth-Præd & Grant (1957), Mohamud *et al.* (1992), Naether (1975b), Pitwell & Goodwin (1964), Smith (1957), Snow (1978), Taibel (1954), Urban (1980), Urban & Brown (1971), Urban *et al.* (1986), Wilson (1991).

6. Stock Dove

Columba oenas

French: Pigeon colombine **German:** Hohltaube **Spanish:** Paloma Zurita
Other common names: Stock Pigeon, Western Stock-dove/Stock-pigeon

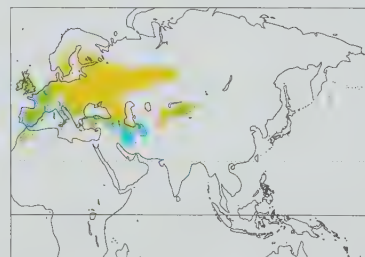
Taxonomy. *Columba Oenas* Linnaeus, 1758, Sweden.

Closely related to *C. eversmanni* and *C. olivacea*. Two subspecies recognized.

Subspecies and Distribution.

C. o. oenas Linnaeus, 1758 - Britain N to S Scandinavia and Finland, S to Portugal and NW Africa, and E to N Iran, Caspian Sea and NE Kazakhstan (Semipalatinsk).

C. o. yarkandensis Buturlin, 1908 - E Uzbekistan, Kirgizia and Tadjikistan E through Tien Shan and Tarim Basin to Lop Nur (E Xinjiang).



Descriptive notes. 32-34 cm; male 303-365 g, female 286-290 g. General colour blue-grey; primaries and secondaries with black tips, conspicuous in flight; two short black bars across upperpart of folded wing with a third shorter and fainter, though in male sometimes quite conspicuous; breast mauve-pink; iridescent patch of green and mauve-pink on both sides of neck, in some individuals meeting across hindneck; tail grey with terminal black band, outermost rectrices with white edges; iris dark brown; orbital skin blue-grey; bill pink basally and yellow distally, cere white; legs red. Female duller, with legs and bill darker. Juvenile even duller; mauve-pink of

breast replaced by rusty fawn; legs dark. Race *yarkandensis* averages paler, with slightly longer wing.

Habitat. Generally fairly open country; often in cultivation, and extending into open woodland; partial to borders between forest and open country, with many old trees providing breeding hollows. European populations inhabit temperate zone at upper and middle latitudes; also boreal and Mediterranean regions, ranging marginally into steppe. Mostly in lowlands occurring up to 500 m, sometimes 1000 m or more; populations resident in Morocco may be found in forests of pine, oak and cedar at 1000-2300 m.

Food and Feeding. Mostly feeds on the ground, taking seeds, grain, green leaves, buds, flowers and some invertebrates; seeds taken include those of weeds such as *Chenopodium*, *Atriplex* and *Rumex*; various legumes; flowers like *Viola*, *Ranunculus* and *Galium*; acorns (*Quercus*) beech-mast (*Fagus*) and pine seeds (*Pinus*).

Breeding. Mainly Apr-Oct. Prefers to nest in holes which may be in old trees, rock crevices, rabbit burrows or buildings; where available, old holes of Black Woodpecker (*Dryocopus martius*) are used; will readily take to nestboxes; some nests may be found in clumps of dense vegetation or even under bushes. Nest is usually a twig platform, although sometimes eggs are laid on bare wood. Normally 2 white eggs, sometimes only 1, and nests with 3-6 eggs have been found, but these are attributed to two females; incubation 16-18 days; young fledge at 16-30 days.

Movements. Northern populations, like those of Fenno-Scandia and E Europe, are almost all migratory; moving further south, populations are progressively less migratory; in S Europe and Asia Minor

birds mainly resident. Birds winter in Iberia and southern half of France, as well as rest of N Mediterranean basin.

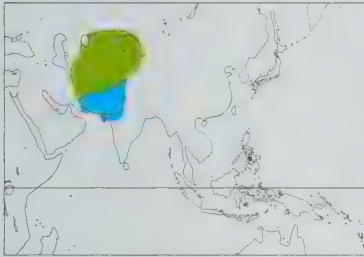
Status and Conservation. Not globally threatened. Still locally fairly common in parts of extensive range; European population estimated at minimum of c. 460,000 pairs. Population expansions have been documented for Britain, Ireland and Netherlands in early 19th century. In Britain, species confined to S & E of England in early 19th century; in 1870's had spread to the north, and in 1877 first bred in Ireland; after 1950 herbicides caused serious reverses in parts of range; populations have subsequently recovered, but never fully. Similar declines have also been documented for Germany, Norway, Sweden, Finland, Poland, Switzerland, former USSR and locally in France.

Bibliography Bauer (1991), van den Bergh *et al.* (1989), Cramp (1985), Delmeé (1954), Doucet (1971), Échécopar & Hùe (1964, 1978), Evans, M.I. (1994), Flint *et al.* (1984), Frieling (1991), Glutz von Blotzheim & Bauer (1980), Goodman *et al.* (1989), Goodwin (1980), Herkenrath (1990), Hillerich (1984), Hochebner & Samwald (1996), Hùe & Échécopar (1970), Jaschke (1980), Karpov (1991), Knystautas (1993), Koller (1976), Kuhlke (1985), Lang (1986), Lange (1993), Lofts *et al.* (1966), Lugin & Regamey (1996), Marchant *et al.* (1990), Möckel (1984, 1994), Möckel & Kunz (1981), Möckel & Wolle (1982), Murton (1964, 1966, 1971a), Murton *et al.* (1964), Nitsche (1993), O'Connor & Mead (1984), Paz (1987), Plaisier (1992), Porter *et al.* (1996), Robertson (1988a), Rogacheva (1992), Rösler (1996), Rutgers & Norris (1970), Saari (1979b, 1984a, 1984b), Samwald *et al.* (1993), Schmid (1987), Shrihar (1996), Simeonov *et al.* (1990), Stallegger (1993), Steiner & Straka (1990), Stepanyan (1990a), Urban *et al.* (1986).

7. Pale-backed Pigeon
Columba eversmanni

French: Pigeon d'Eversmann **German:** Gelbaugentaube **Spanish:** Paloma del Turquestán
Other common names: Eastern/Eversmann's Stock-dove/Stock-pigeon, Yellow-eyed Pigeon

Taxonomy. *Columba eversmanni* Bonaparte, 1856, west and central Asia. Forms a superspecies with *C. oliviae*; also closely related to *C. oenas*. Monotypic.
Distribution. W Asia from Aral Sea to Tien Shan, and S to NE Iran and Afghanistan. Winters S to SE Iran, Pakistan and NW India.



Descriptive notes. 25-31 cm; 183-234 g. General colour bluish grey; crown and breast mauve-pink; underwing-coverts, lower back and upper rump white or pale grey, lower rump and uppertail-coverts dark grey; iris yellow or yellowish brown; orbital skin pale yellow or cream; bill brownish or dark green basally, yellow to yellowish green or green distally; legs yellowish flesh. Female duller, legs and bill with a dusky wash. Juvenile duller than adult, with head and breast rusty fawn.

Habitat. Steppe and neighbouring lowlands in lower middle latitudes, and even deserts; also in mountain valleys close to sources of water; typically found on agricultural land on floodplains in winter.

Food and Feeding. Feeds on the ground, taking seeds, and maize and other cereals from stubble; also observed taking ripening mulberries (*Morus*) from trees.

Breeding. Season Apr-Aug. Nests in clefts in cliffs and also in European Roller (*Coracias garrulus*) burrows; also nests in hollows of old gnarled poplars (*Populus*), elms (*Ulmus*), planes (*Platanus*) and in orchards or ruined buildings. Lays 2 white eggs. No further information available.

Movements. Most populations migratory, flying S to winter in Pakistan, NW India, Afghanistan and Iranian Baluchistan; some N birds merely make altitudinal movements, e.g. in W Xinjiang (NW China). May fly 5-10 km from nesting or roosting sites to forage.

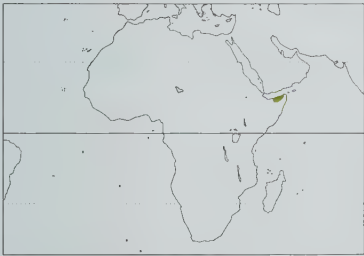
Status and Conservation. **VULNERABLE.** Populations have declined for unknown reasons, perhaps related to conversion of steppe for agriculture; species is now rare in most parts of range, and requires close monitoring, as well as increased research effort.

Bibliography. Abdulali (1970), Ali & Ripley (1981), Aspinall (1996b), Baker (1913), Collar *et al.* (1994), Cramp (1985), Échécopar & Hùe (1978), Evans, M.I. (1994), Flint *et al.* (1984), Hùe & Échécopar (1970), Knystautas (1993), Meinertzhagen (1938), Meyer de Schauensee (1984), Mukherjee (1995), Paludan (1959), Porter *et al.* (1996), Roberts, T.J. (1991), Robson (1996a), Rösler (1996), Salvadori (1893), Stepanyan (1990a), Underland (1997), Vaurie (1972).

8. Somali Pigeon
Columba oliviae

French: Pigeon de Somalie **German:** Somalitaube **Spanish:** Paloma Somali
Other common names: Somali Rock-pigeon, Somali Stock-dove

Taxonomy. *Columba oliviae* S. R. Clarke, 1918, Dubbar, Somalia. Forms a superspecies with *C. eversmanni*; also closely related to *C. oenas*. Monotypic.
Distribution. Coasts of N & NE Somalia.



Descriptive notes. 28 cm. General colour lavender-grey, mantle and wings with brownish tinge; lower back and rump bluer, darker grey; primaries tipped with black; tail black with grey central band; forehead, crown and nape mauve-pink; hindneck with patch of iridescent coppery brown with green suffusion; iris yellow; orbital skin red or purplish red; bill black, cere white; legs pink. In some individuals wings are flecked with black, atavistic remnants of wingbars found in *C. eversmanni*. Sexes alike. Juvenile unknown.

Habitat. Inhabits rocky and sandstone hills and escarpments; found in areas of scant vegetation

and almost no water, up to 800 m.

Food and Feeding. Feeds mostly on the ground, where takes seeds; cultivated grain; berries also known to be eaten.

Breeding. Nests found in May and Aug. Two nests examined were made of dried grass placed in recesses in cave roofs. Each contained one egg.

Movements. Locally migratory, in hot weather of May-Sept absent from cliffs at Guban.

Status and Conservation. **VULNERABLE.** A very poorly known species, in urgent need of study; although not known to be declining, species may be threatened, considering its very small range.

Surveys required, in order to establish current population size, trends, and conservation requirements. Effects of extended period of warfare within species' limited range remain to be determined.

Bibliography. Archer & Godman (1937-1961), Ash & Miskell (1983), Collar & Andrew (1988), Collar & Stuart (1985), Collar *et al.* (1994), Dowsett & Forbes-Watson (1993), Mackworth-Præd & Grant (1957), Rösler (1996), Snow (1978), Urban *et al.* (1986).

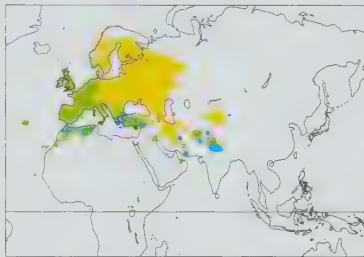
9. Common Woodpigeon
Columba palumbus

French: Pigeon ramier **German:** Ringeltaube **Spanish:** Paloma Torcaz
Other common names: Ring Pigeon, Ringdove, Cushat, Cushie-doo, Quest

Taxonomy. *Columba Palumbus* Linnaeus, 1758, Sweden. Related to *C. bollii* and *C. trocaz* of Macaronesia (E Atlantic islands) and *C. unicolor* of Africa; probably also to *C. junoniae* of Canary Is. Race *iranica* intergrades with nominate in E Turkey and Transcaucasia. Six subspecies recognized.

Subspecies and Distribution.

C. p. azorica Hartert, 1905 - E & C Azores.
C. p. maderensis Tschusi zu Schmidhoffen, 1904 - montane forests of Madeira (probably extinct).
C. p. excelsa (Bonaparte, 1856) - Morocco, Algeria and Tunisia.
C. p. palumbus Linnaeus, 1758 - Europe E to W Siberia and Iraq; winters S to N Africa.
C. p. iranica (Zarudny, 1910) - S Transcaspiya, N & W Iran.
C. p. casiotis (Bonaparte, 1854) - Kazakhstan and Uzbekistan to N Afghanistan, N Pakistan, NW India and Nepal.



Descriptive notes. 41-45 cm; 284-690 g. General colour bluish grey, duller on wings; primaries black with pale edges; breast mauve-pink merging to creamy on belly; flanks grey; feathers along edge of wing white, forming a band on open wing; iridescent purple-pink and green feathers beside a white patch on each side of neck; rectrices grey with broad black terminal band; pale greyish white central band evident on underside of tail, but less conspicuous on upperside; iris greenish white to pale golden; orbital skin grey; bill purplish pink basally, golden distally, cere white; legs reddish purple. Female tends to have smaller white neck patches;

breast less pink. Juvenile duller and paler, feathers edged with conspicuous or faintly indicated fawn or rust; breast rusty fawn; white and iridescence on neck lacking. Races *maderensis* and *azorica* duller, with smaller neck patches; *excelsa* tends to be brighter; *iranica* has bill whitish to pale yellow; *casiotis* has neck patches creamy buff rather than white.

Habitat. Typically a species of ecotone in deciduous or coniferous woodland. Occurs at 1500-1600 m, and even up to tree-line in the Alps. Original breeding habitat in C Europe was edge of old mixed pine and oak forests; not adversely affected by fragmentation of forests due to agricultural practices, and in early 19th century started to colonize towns. In the higher woods in Britain found in ash (*Fraxinus*) forests up to 370 m, and in beech, oak and ash woods in lowland; also inhabits plantations of exotics notably Sitka spruce (*Picea sitchensis*) and Douglas fir (*Pseudotsuga menziesii*).

Food and Feeding. Takes most of food from ground, but also feeds in trees. Most of diet made up of plant matter, including green leaves, buds, flowers, seeds, berries and root crops; grain taken includes wheat (*Triticum*), barley (*Hordeum*), oats (*Avena*), maize (*Zea*) and rape (*Brassica*); fruits and seeds consumed include those of oak, beech, elder (*Sambucus*); leaves eaten include those of clover (*Trifolium*), rape and cabbage (*Brassica*). Various invertebrates are also occasionally eaten, including earthworms, gall wasps, beetles, pupae of lepidoptera, spiders, slugs and snails. As many as 107 different crop species have been identified as winter food in Sweden.

Breeding. Season varies with zone, ranging from late Feb to early Sept. Nest 17-23 cm in diameter, consists of twigs up to 20 cm long; lined with finer twigs, grasses and leaves; nests become bulkier with repeated use; placed 1.5-2.5 m above ground in fork of tree or on branch, in a creeper in tree, or rarely on ground in thick vegetation or under a hedge, or even on ledge of a building. Normally 2 white eggs (1-3); incubation 16-17 days, beginning with first egg; fledging 28-29 days, although exceptionally squabs may stay in the nest until 34 days old.

Movements. N and E European birds mostly migratory, as are W Siberian populations; species partially migratory or resident in W, C & S Europe. Populations living in middle Atlas Mts of Morocco fly daily to plains to feed, although some individuals may forage only 15 m from the nest.

Status and Conservation. Not globally threatened. Generally common to very common or even abundant, e.g. in many parts of Britain, where it is frequently very tame, especially in town gardens. A notably successful species, as evidenced by the fact that it continues to spread into urban areas; in 20th century, has expanded its range northwards to Fenno-Scandia and Faeroe Is; occasionally breeds in Finland. Apparently no longer breeds in Madeira, where the endemic race is probably extinct; rare in Azores, and possibly decreasing in eastern and southern parts of its range.

Bibliography. Alerstam & Ulfstrand (1974), Ali & Ripley (1981), Bariery (1971), Björnsma (1980, 1984), Boddy (1978, 1981), Bogliani *et al.* (1992), Cain & Hillgarth (1974), Cain *et al.* (1982), Collar (1978), Cramp (1985), Dobson (1990), Donkers (1994), Échécopar & Hùe (1964, 1978), Evans, M.I. (1994), Flint *et al.* (1984), Folk (1984), Gallego (1981, 1985), Gatter & Penski (1978), Gatter *et al.* (1990), Glutz von Blotzheim & Bauer (1980), Gnielka (1978), Górski & Górka (1991), Gulai (1991), Haque *et al.* (1982), Herkenrath (1989a, 1989b), Hill *et al.* (1991), Hogg (1980), Hùe & Échécopar (1970), Inglis & Isaacson (1984), Inglis, Isaacson & Thearle (1994), Inglis, Isaacson, Thearle & Westwood (1990), Inglis, Wright & Lill (1994), Jennings (1995), Jiménez *et al.* (1994), Jurkutat & Wimmer (1996), Kenward (1978a, 1978b, 1979, 1985), Kenward & Sibly (1978), Khounganan & Meininger (1992), King (1978/79), Kirchhoff (1994), Knystautas (1993), Kotov (1976a), Marchant *et al.* (1990), Möller (1982), Murton (1964, 1966, 1971b), Murton & Isaacson (1962), Murton & Jones (1974), Murton & Westwood (1974), Murton, Isaacson & Westwood (1971), Murton, Westwood & Isaacson (1964, 1974a, 1974b), Newton (1993), Paz (1987), Peitzmeier (1974), Porter *et al.* (1996), Purroy (1987), Purroy & Rodero (1986), Purroy *et al.* (1984), Rademacher (1992), Rebecca (1988), Ripley (1982), Roberts, T.J. (1991), Robertson (1988a), Rogacheva (1992), Rutgers & Norris (1970), Saari (1979a, 1979b, 1984a, 1984b), Sartor (1982), Scharlau & Scharlau (1990), Schlupeppmann (1986), Schnock (1981a, 1981b), Schnock & Seutin (1975), Shrihar (1996), Simeonov *et al.* (1990), Sondergaard (1983), Stepanyan (1990a), Tomialoje (1976, 1978, 1980a, 1980b), Urban *et al.* (1986), Wittenberg (1980).

10. Madeira Laurel-pigeon
Columba trocaz

French: Pigeon trocaz **German:** Silberhalstaube **Spanish:** Paloma de Madeira
Other common names: Long-toed/Trocaz Pigeon,

Taxonomy. *Columba Trocaz* Heineken, 1829, Madeira.

Forms a superspecies with *C. bollii* with which it is sometimes considered conspecific; also related to *C. palumbus*, *C. unicincta* and probably *C. junoniae*. Monotypic.

Distribution. Madeira.



Descriptive notes. 38-40 cm; 500 g. Differs from closely related *C. palumbus* in its darker slate colour; neck patches silvery grey, meeting at back of neck; throat and upper neck grey, breast duller pink tending towards orange; pinkish area more restricted; white wing patch absent; iris pale yellow; orbital skin red; legs coral red. Sexes alike. Juvenile duller and browner, lacking iridescence.

Habitat. High forest zone, which is often covered in clouds; tall laurel trees (*Laurus*) and dense tree heather (*Erica arborea*) are two major components of its habitat.

Food and Feeding. Feeds mainly on fruit, but

also takes leaves and grain; much of diet consists of fruit of bay (*Laurus azorica*), til (*Ocotea foetens*), haya (*Myrica faya*) and viñatigo (*Persea indica*). In autumn, visits cultivated areas, where forages on grain and other items including cherries (*Prunus*) and other fruit, as well as cabbage; also known to feed on grasses. Forages both in the canopy and on the ground, where takes fallen fruit.

Breeding. Nests all year round, but mainly Feb-Jun. Most nests are placed in crevices and caves in inaccessible cliffs; occasionally in heather and laurels; nest is an untidy heap of sticks. Lays 1 white egg; incubation 19-20 days; one nestling was seen to fledge at 28 days.

Movements. Sedentary; may move from cliffs to lowlands to feed, especially in autumn.

Status and Conservation. Not globally threatened. Conservation Dependent. Numbers have declined over the last century but now appear more or less stable at estimated 3500-4950 birds; populations prone to slump in years of food shortage. Laurel forests have been reduced to only 13-5% of surface area of Madeira, but this is now protected as a park; forests still suffer from fires, as result of burning to improve pasture; goats and pigs also cause some destruction. Birds were commonly shot and poisoned when they invaded crops during bad periods of food shortage within forests; until recently, c. 500 birds annually killed thus, often during breeding season; however, species now protected under European law, and farmers are provided with bird-scarers. Some eggs and young are lost to black rats (*Rattus rattus*), which continue to pose a serious problem. Continued survival of species depends directly on protection of habitat and strict control of hunting, and perhaps also of rats.

Bibliography. Bannerman & Bannerman (1965), Beaman (1994), van den Berg (1980), van den Berg & de Wijs (1980), Collar & Andrew (1988), Collar & Stuart (1985), Cramp (1985), Étiéhcopar & Hùe (1964), Heinroth (1922), Jones, M.J. (1988, 1990), King (1978/79), Rösler (1996), Schmitz (1910), Zino, A. (1969), Zino, F. *et al.* (1994).

11. Dark-tailed Laurel-pigeon

Columba bollii

French: Pigeon de Bolle

German: Bolles Lorbeertaube

Spanish: Paloma Turqué

Other common names: Bolle's Laurel-pigeon/Pigeon

Taxonomy. *Columba bollii* Godman, 1872, Tenerife.

Forms a superspecies with *C. trocaz*, with which it is sometimes considered conspecific; also related to *C. palumbus*, *C. unicincta* and probably *C. junoniae*. Monotypic.

Distribution. Canary Is, occurring on La Palma, Gomera, Tenerife and El Hierro; formerly also on Gran Canaria, where now extinct.



Descriptive notes. 35-37 cm. Similar to *C. trocaz*, but silvery grey neck area of latter replaced by a small coppery brown patch on each side of neck; iris darker yellow; feet red. Sexes alike. Juvenile duller and browner, lacking iridescence.

Habitat. Dense laurel forests in mountainous areas, especially in ravines; also in heath of *Myrica faya* and *Erica arborea*, and sometimes in rather open areas, e.g. cultivation. Retires to deep shade of laurel trees in the heat of the day.

Food and Feeding. Mostly feeds on fruit, but also takes grain and occasionally buds, leaves and shoots; also invertebrates; summer diet consists

mostly of *Persea indica*, *Rhumnus glandulosa*, *Picconia excelsa*, *Apollonia barbusana*, *Laurus azoricus* and *Myrica faya*; winter diet mostly made up of *Laurus*, *Myrica*, *Rhumnus* and *Ilex canariensis*. Will gather in large concentrations at a fruiting tree; plucks berries from trees but also feeds on the ground.

Breeding. Breeds Jan-Sept. Nest placed in tree heath (*Erica*), *Laurus*, *Myrica* or *Viburnum*, 3-6 m above the ground. Lays 1 egg; in captivity, incubation 18-19 days.

Movements. In late summer, flies to lower altitudes to feed on ripe cereals and fruit.

Status and Conservation. **VULNERABLE.** Extinct on Gran Canaria where it was last recorded in 1889; has been in decline since mid-15th century, and range now reduced to c.35-40% of original as result of habitat destruction. A census in 1994 estimated total of c. 1700 birds, with 350-400 birds on Tenerife, 250-300 on La Palma, over 1000 on Gomera, and as few as 10-15 on El Hierro. Deforestation, inappropriate forest management, illegal hunting and introduced predators (cats, rats) are reckoned to be serious threats to the survival of this species; apparently more susceptible to habitat destruction than *C. junoniae*. Poaching with guns and traps continues at a rather high level on Tenerife and Gomera. Populations require close monitoring, and stricter protection.

Bibliography. Anon. (1995k), Bannerman (1963), Beaman (1994), van den Berg (1980), Collar & Andrew (1988), Collar & Stuart (1985), Collar *et al.* (1994), Cramp (1985), Emmerson (1985), Emmerson, Martín, Bacallado & Lorenzo (1994), Emmerson, Martín, Delgado & Quilis (1987), Étiéhcopar & Hùe (1964), Hernández & González (1996a, 1996b), Huizinga (1984), King (1978/79), Löhr (1981), Lorenzo (1994), Martín (1985), Martín *et al.* (1993), Moreno (1988).

12. Afep Pigeon

Columba unicincta

French: Pigeon gris

German: Kongotaube

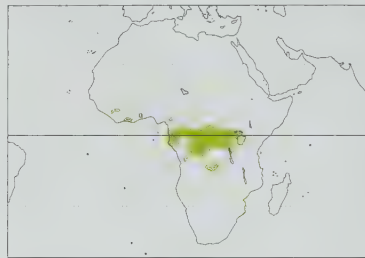
Spanish: Paloma del Congo

Other common names: Grey Woodpigeon

Taxonomy. *Columba unicincta* Cassin, 1860, Ogooué River, Gabon.

Part of the *C. palumbus* species-group also including *C. bollii* and *C. trocaz*, and probably *C. junoniae*. Monotypic.

Distribution. Liberia sparsely to Gabon, Congo and NW Angola, then E through Zaire to Uganda.



Descriptive notes. 35-36 cm; 356-490 g. Crown and hindneck silvery grey; upperparts and wings slate grey; feathers of mantle, back and rump have silver grey edges, narrower on outer wing-coverts, secondaries and primaries; dark slate-coloured tail has broad greyish white central band, less pronounced on two central rectrices; throat and belly white, breast vinous pink; iris orange or red; orbital skin dark red; legs grey; bill grey, tip pale grey or whitish. Female has pink on breast duller and often suffused with grey. Juvenile has feathers with conspicuous buff and chestnut tips and dark subterminal bands.

Habitat. Inhabits forest, typically in canopy, but sometimes forages along the forest edge; occupies montane and riparian forests, as well as canyons with tall trees; also frequents *Marquesia* thickets away from water; in NW Angola, found in coffee forests. Found essentially in lowlands, up to 1600 m in Cameroon and Uganda.

Food and Feeding. Fruits, berries and seeds, including those of *Solanum torvum*, *Musanga*, *Coelocaryon*, *Eisterya*, various *Ficus* and *Sapium mannianum*. Small winged termites were found in the crop of one bird.

Breeding. Limited data available suggest breeding in the dry season Jan-Sept. Nest of sticks is placed high in a tree. Single white egg. No further information available.

Movements. Generally resident. In Zambia, may be partially migratory.

Status and Conservation. Not globally threatened. Details on population lacking for most of range, and biology remains very poorly known. In W African portion of range, populations appear to be markedly disjunct, at least to some extent reflecting distribution of forest; in Sierra Leone, uncommon in Gola Forest, and probably also in remaining forest further N; rare in Ghana, with few records. Apparently also uncommon at E extreme of range in S Uganda. Frequent to locally common in some central parts of range, notably S Cameroon, Gabon and NW Angola. CITES III in Ghana.

Bibliography. Ash (1990), Bannerman (1953), Britton (1980a), Chapin (1939), Colston & Curry-Lindahl (1986), Dowsett & Forbes-Watson (1993), Elgood *et al.* (1994), Gatter (1988), Grimes (1987), Lippens & Wille (1976), Louette (1981), Mackworth-Præd & Grant (1957, 1962, 1970), Nikolaus (1987), Penry (1979b), Pinto (1983), Rösler (1996), Serle *et al.* (1977), Short *et al.* (1990), Snow (1978), Thiollay (1985), Urban *et al.* (1986).

13. White-tailed Laurel-pigeon

Columba junoniae

French: Pigeon des lauriers

German: Lorbeertaube

Spanish: Paloma Rabiche

Taxonomy. *Columba junoniae* Hartert, 1916, La Galga, Palma, Canary Islands.

Probably part of the *C. palumbus* species-group also including *C. unicincta*, *C. bollii* and *C. trocaz*, but some authors consider it a distinct form only rather distantly allied to this group. *C. laurivora* is a synonym. Monotypic.

Distribution. La Palma and Gomera, in W Canary Islands; also discovered on Tenerife in 1975, where now established as a breeding bird.



Descriptive notes. 37-38 cm. Forehead, face and throat dark grey with some green or mauve iridescence; crown, nape and neck mostly iridescent green merging into iridescent reddish purple on neck and upper mantle; lower breast and underparts wine red; lower back and rump dark bluish grey merging into a lighter hue on uppertail-coverts and two central rectrices; outer rectrices dark bluish grey crossed by a broad, barely discernible, whitish terminal band, which is more conspicuous on drab grey underside of tail; iris orange, eyelids red; bill wine red basally, pink or pinkish white distally; legs red. Female tends to have slightly paler red-purple

on neck and breast. Juvenile duller and browner; wing-coverts fringed with rusty brown.

Habitat. Laurel forest, generally below the high level belt, in mountainous parts of the islands, typically in deep canyons and on steep slopes and large escarpments, up to 1600 m. Vegetation comprises dense woods of *Erica arborea*, *Laurus* and *Myrica faya* amongst others; prefers mature laurel forest, but also found in scrubby zones at lower limit of forest, and in mixed pine stands at its upper limit.

Food and Feeding. Feeds mostly on fruit, buds, some grain and flowers; most of diet made up of fruits of *Ocotea foetens* and *Persea indica*, but also feeds on *Ilex canariensis* and *Laurus azorica*. Feeds both in trees and on the ground; more terrestrial than *C. bollii*, and can run quickly on the ground. Locally also feeds in orchards.

Breeding. Recorded Mar and May-Sept, but may occur throughout year. Nest placed on rock ledge where ferns are abundant, or beneath tree trunks or stones, within the forest. Clutch is 1 creamy white egg, occasionally 2.

Movements. Sometimes moves from upland forests to lowland agricultural areas to feed.

Status and Conservation. **VULNERABLE.** Total population estimated at 1200-1480 birds in 1985, and thought to be relatively stable: 1000-1200 on La Palma; 120-160 on Gomera; and 80-120 on Tenerife. Population on Tenerife is restricted to small areas; only discovered on the island in 1975, although a report from 1871 suggests that it was present long before, but probably overlooked. Has suffered much from overhunting and habitat loss in the past and these factors may continue to affect populations in the future; introduced predators also have significant impact, especially rats, less so cats, and ground-nesting habits makes present species more vulnerable than sympatric tree-nesting *C. bollii*. Hunting banned in 1973, but evidence suggests that it continues illegally at a considerable level, especially at drinking and feeding sites. Laurel forest has undergone serious destruction for five centuries, especially on La Palma, where inroads are still occurring; most of the forests on this island are privately owned, and exploitation and degradation continue at present.

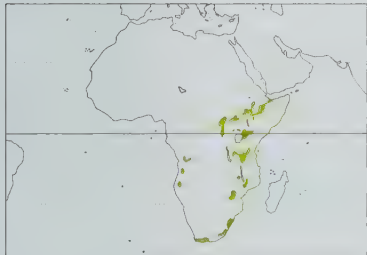
Bibliography. Anon. (1995k), Bannerman (1963), Beaman (1994), Collar & Andrew (1988), Collar & Stuart (1985), Collar *et al.* (1994), Conrad (1979), Cramp (1985), Cullen *et al.* (1952), Emmerson (1985), Emmerson *et al.* (1994), Étiéhcopar & Hùe (1964), Hernández (1994), Hernández & Martín (1994), Huizinga (1984), King (1978/79), Koenig (1890), Löhr (1981), Meade-Waldo (1889), Moreno (1988).

14. African Olive-pigeon

Columba arquatrix

French: Pigeon rameron **German:** Oliventaube **Spanish:** Paloma Ojigualda
Other common names: Rameron/Yellow-eyed/Spckled(!) Pigeon

Taxonomy. *Columba* [sic] *Arquatrix* Temminck, 1809. Knysna, Cape Province. Forms a superspecies with *C. sjostedti*, *C. thomensis* and *C. pollenii*, and all four are sometimes considered conspecific; also closely related to Asiatic *C. hodgsonii*, which may belong within this superspecies. Monotypic.
Distribution. Scattered distribution from Ethiopia S through E Zaire and Tanzania to S South Africa; disjunct populations in W Angola.



Descriptive notes. 38-41 cm; male 269-429 g, female 288-425 g. Forehead and face dark purple, paler on throat, merging to silvery purple or bluish mauve on breast; feathers of hindneck and upper mantle lanceolate, dark brown with pale mauve tips; hindcrown and nape silvery grey; rest of mantle and inner wing-coverts dark purple, merging to very dark bluish slate on outer wing-coverts and rump; primaries and tail black; lower breast and belly dark purple merging into bluish grey flanks and undertail-coverts; profuse white spotting on feathers of upper mantle, inner and median wing-coverts and purple areas of lower breast and belly, each feather with one or two spots near edge of outer web or on both webs; underwing dark slate; iris pale greenish yellow, greenish grey or pale brown; orbital skin prominent, brilliant yellow; bill, cere and legs brilliant yellow. Female usually somewhat duller, with male's purple parts bluish and nape and hindcrown less silvery and darker. Juvenile duller and paler; spotting of adults replaced by white fringes, often edged with rust; areas unspotted in adult are fringed rufous; all soft parts dark, with no trace of yellow.

Habitat. Frequents canopy in evergreen forest at altitudes of 300-3200 m, mostly above 1400 m; also occurs in riparian and coastal forest. In places, invades plantations of exotic pine, eucalyptus and wattle.
Food and Feeding. Relishes olive-like drupes, and also takes other fruits, seeds, some insects and their larvae. In one study in South Africa, 30 native fruit species were catalogued as food items including *Calodendrum*, *Celtis*, *Ficus*, *Kiggelaria*, *Phytolacca*, *Prunus*, *Podocarpus*, *Sideroxylon* and *Trema*; favourite fruits in Zambia are *Afrocrania volkensii* and ironwood (*Olea capensis*); also takes cultivated fruits such as grapes, mulberries, olives and seeds of *Pinus pinea*; in one study in Natal fruit of introduced *Solanum mauritanum* comprised the entire diet of 95% of individuals. Food is garnered mostly from the canopy of large trees but also from mid-stratum; birds will also feed on the ground. On Nyika Plateau (NE Zambia and N Malawi), density found to be related to food availability, ranging from 1 pair/20 ha to 4 pairs/4-7 ha.

Breeding. Occurs all year round in some areas. Pairs occupy territories of 0.8-3.0 ha. Nest platform of twigs is lined with a few green leaves, situated 1-14 m above ground in shrubby vegetation. Usually 1 egg, rarely 2; incubation 20 days; fledging c. 19 days.

Movements. Populations in South Africa, Zambia and Zimbabwe have been noted to be nomadic, probably seeking fruiting trees. Flocks living in Ruwenzori Mts of Uganda and in South Africa make daily flights between the highland forests where they roost to the deep valleys and lowland forests where they forage.

Status and Conservation. Not globally threatened. Uncommon to frequent and locally common throughout most of E African range. In the period 1850-1865 this species was abundant in parts of South Africa, visiting the Natal coasts in flocks of thousands from which hundreds were shot; in 1920's, flocks of 100-200 birds were noted in the Knysna forest, and flocks of even 2500 birds were still reported from ironwood forests there; today large flocks of hundreds no longer exist in the region, and species has become rare in Durban. Reasons for this decline are unclear, although hunting and habitat destruction are certainly in part contributing factors; with protection in South Africa, species has again increased in numbers in Natal and elsewhere in the last two decades.

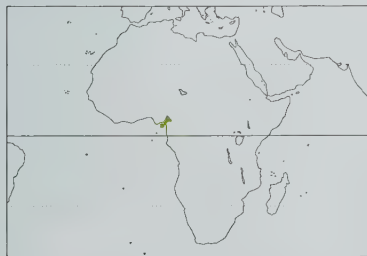
Bibliography. Ash & Miskell (1983), Beaman (1994), Benson & Benson (1977), Britton (1980a), Chapin (1939), Clancey (1964b), Dean (1987), Dowsett (1996), Dowsett & Dowsett-Lemaire (1993), Dowsett & Forbes-Watson (1993), Evans, M.I. (1994), Friedmann (1930a), Ginn *et al.* (1989), Jennings (1987, 1995), Lewis & Pomeroy (1989), van der Linde (1982), Lippens & Wille (1976), Mackworth-Praed & Grant (1957, 1962, 1970), Maclean (1993), Martin *et al.* (1986), Nikolaus (1987), Oatley (1984), Phillips (1927), Pinto (1983), Porter *et al.* (1996), Roberts (1924), Rösler (1996), Rowan (1983), Rutgers & Norris (1970), Short *et al.* (1990), Snow (1978), Urban *et al.* (1986), Uys (1967, 1995), Verheyen (1955), Zimmerman (1972), Zimmerman *et al.* (1996).

15. Cameroon Olive-pigeon

Columba sjostedti

French: Pigeon du Cameroun **German:** Rotschnabele-Oliventaube **Spanish:** Paloma del Camerún
Other common names: Sjostedti's/Cameroon Rameron Pigeon

Taxonomy. *Columba sjostedti* Reichenow, 1898, Cameroon. Forms a superspecies with *C. arquatrix*, *C. thomensis* and *C. pollenii*, and all four are sometimes considered conspecific; Asiatic *C. hodgsonii* may also belong within this superspecies. Monotypic.
Distribution. Obudu and Mambilla Plateaux in E Nigeria, and Cameroon highlands from Mt Cameroon NE to Mt Oku (Kilum); also Bioko.



Descriptive notes. 33-37 cm. Differs from *C. arquatrix* in that entire head is uniform bluish grey; white spotting profuse on breast, and spots on belly larger; bill red basally, yellow for rest of length; iris yellowish, no bare orbital skin; legs dark purple. Sexes alike. Juvenile differs from that of *C. arquatrix* in having breast and belly more heavily spotted with soft white; less grey on nape.
Habitat. Inhabits dense misty montane forests and gullies with forest from 1000 m up to 2500 m; on Mt Cameroon, occupies this altitude range, where forest merges into elfin zone with tree-ferns. In Gashaka-Gumti National Park (CE Nigeria), occurs in gallery mist forest, up to 2500 m.

Food and Feeding. Known to eat fruit with watery pulp and hard seeds. No further information.

Breeding. One nest found in May was made of criss-crossed twigs placed 8 m high in a tree in a forest clearing; this nest contained a single white egg.
Movements. Resident. May cover notable distances when searching for food.
Status and Conservation. Not globally threatened. Despite restricted range, few precise details available. Abundant in Mar in Gashaka-Gumti National Park, and not uncommon in flocks of up to 10 birds on Obudu Plateau. Habitat destruction has been fairly intensive on S slopes of Mt Cameroon; still apparently quite common on Mt Oku, although habitat has been severely damaged.
Bibliography. Amadon (1953), Bannerman (1953), Basilio (1963), Bates (1927), Dowsett & Dowsett-Lemaire (1993), Dowsett & Forbes-Watson (1993), Eisentraut (1973), Elgood *et al.* (1994), Louette (1981), Mackworth-Praed & Grant (1970), Pérez del Val (1996), Pérez del Val *et al.* (1994), Rösler (1996), Serle (1957), Snow (1978), Urban *et al.* (1986), Wells (1968), Wolff-Metternich & Stresemann (1956).

16. Sao Tome Olive-pigeon

Columba thomensis

French: Pigeon de Sao Tomé **German:** Langschwanz-Oliventaube **Spanish:** Paloma de Santo Tomé
Other common names: Maroon Pigeon, Sao Tome Maroon-pigeon, Sao Tome Pigeon

Taxonomy. *Columba arquatrix* var. *thomensis* Bocage, 1888, São Tomé. Forms a superspecies with *C. arquatrix*, *C. sjostedti* and *C. pollenii*, and all four are sometimes considered conspecific; Asiatic *C. hodgsonii* may also belong within this superspecies. Monotypic.
Distribution. São Tomé: formerly also on I das Rôlas, to S of main island.



Descriptive notes. 37-40 cm; male 520-530 g, female 350 g. Entire head dark slate-grey; neck feathers lanceolate but less so than in *C. arquatrix* and *C. sjostedti*, each feather black basally but blue-grey with pearly sheen on tip; neck tinged with deep purple; mantle deep maroon, back and rump slaty black, uppertail-coverts dark brown; underparts rich maroon, belly and flanks with faint white spotting; iris olive brown or dull olive; bill yellowish horn; legs yellow. Female similar but duller; breast and wing-coverts with only hints of maroon, mostly dark brown, with spots in male. Juvenile dark brown; lacks white spotting; feathers edged with chestnut.

Habitat. Primary rain forest from sea-level up to 2024 m; however, on eastern part of the island, found only above 1300 m.

Food and Feeding. Known to take berries of *Scheffleria mannii*.
Breeding. No information available.

Movements. No information available, but presumably sedentary.
Status and Conservation. VULNERABLE. Has undergone a serious decline in numbers within its extremely restricted range; now only reasonably common in a very limited area above 1600 m. Became extinct on tiny I das Rôlas, due to heavy destruction of forest. Hunting and habitat loss continue to pose a threat to survival of species; numbers may already have dropped too low for maintenance of a viable population in lower part of range. Strict protection required of upland birds and their habitat; research needed into ecology and biology, in order to establish more precise conservation requirements.

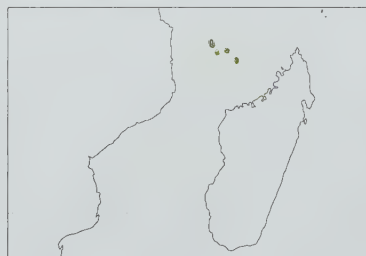
Bibliography. Atkinson *et al.* (1994), Bannerman (1931), Collar & Andrew (1988), Collar & Stuart (1985), Collar *et al.* (1994), Dowsett & Dowsett-Lemaire (1993), Dowsett & Forbes-Watson (1993), Jones, P.J. & Tye (1988), Jones, P.J. *et al.* (1992), Mackworth-Praed & Grant (1970), de Naurois (1994), Snow (1950, 1978), Urban *et al.* (1986).

17. Comoro Olive-pigeon

Columba pollenii

French: Pigeon des Comores **German:** Komorentaube **Spanish:** Paloma de las Comores
Other common names: Comoro Pigeon, Comoro Woodpigeon

Taxonomy. *Columba pollenii* Schlegel, 1866, Maore (Mayotte), Comoro Islands. Forms a superspecies with *C. arquatrix*, *C. sjostedti* and *C. thomensis*, and all four are sometimes considered conspecific; Asiatic *C. hodgsonii* may also belong within this superspecies. Monotypic.
Distribution. Comoro Is.



Descriptive notes. c. 35-40 cm. Head, neck, breast and upper mantle dull purplish red with grey admixed; hindneck of lanceolate feathers with purplish centres and white fringes (or white edged outer web only), giving impression of a white patch with dark streaks on back and each side of neck; lower mantle, most of wings and uppertail-coverts dark greyish brown with bluish grey wash; primaries and rectrices brownish black; belly and underwing-coverts bluish grey, with occasional poorly discernible whitish spots; lower back and rump paler than underparts; iris yellow, yellowish brown or pale brown; orbital skin, bill and legs yellow. Female duller with reduced or no purplish red tinge on head and breast; browner below. Juvenile similar to female but most contour feathers with tawny or reddish buff fringes; bill, legs and iris dark.

Habitat. Evergreen forest, usually at high elevations; however, on Maore, extends down to sea-level.
Food and Feeding. Feeds on fruit plucked from trees, but also appears to take some food from ground.

Breeding. A nest with a single egg was found 5 m above the ground. No further information available.
Movements. Sedentary.

Status and Conservation. Not globally threatened. Currently considered near-threatened. A little known species with a restricted range on small islands; populations require monitoring; locally abundant on Ngazidja in late 1980's. Thought to be threatened by hunting throughout the islands; this problem requires establishment of hunting regulations, and their enforcement. Not known to be seriously affected by habitat degradation or introduced predators, but these are potentially serious risks; species not found in plantations or gardens during recent surveys, and may not adapt well to disturbed habitat.

Bibliography. Benson (1960), Dowsett & Dowsett-Lemaire (1993), Dowsett & Forbes-Watson (1993), Louette (1988, 1992), Louette & Stevens (1992), Louette *et al.* (1988), Rösler (1996), Stevens, Herremans & Louette (1992), Snow (1978), Stevens, Louette *et al.* (1995).

inches 9
cm 23

PLATE 4



18. Speckled Woodpigeon

Columba hodgsonii

French: Pigeon de Hodgson

German: Schwarzschnabel-Oliventaube

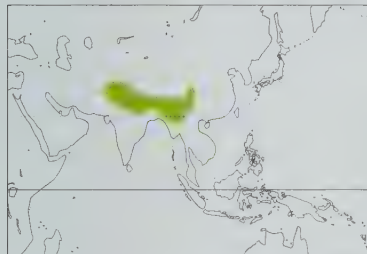
Spanish: Paloma de Hodgson

Other common names: Hodgson's/Jungle Pigeon

Taxonomy. *Columba Hodgsonii* Vigors, 1832, Nepal.

Often considered to be an Asiatic representative of the *C. arquatrix* superspecies which includes *C. sjostedti*, *C. thomensis* and *C. pollenii*. Monotypic.

Distribution. Himalayas from Kashmir E to WC China (S Gansu, W Sichuan and W Yunnan) and Myanmar.



Descriptive notes. 38-40 cm. Head pale grey; breast and sides of neck pinkish silver speckled with black spots; each feather silver with a dark central streak and silvery pink tip; hindneck feathers lanceolate, black or purplish black basally and silver at tips giving neck a speckled appearance; mantle and wing-coverts dark reddish purple merging into bluish grey on outer wing-coverts and rump; tail and primaries black; some silver flecking on upper mantle, small white spots on inner and median wing-coverts; belly dark reddish purple with pinkish white streaks, each feather purplish with white fringes; ventral area, undertail-coverts and underwing slate-grey; iris white or greyish white; orbital skin grey; bill bluish purple basally, black distally; legs brownish yellow to green, claws bright yellow. Female has silver areas replaced by light grey or brownish grey; purplish areas dark grey; iris with grey or brown tinges. Juvenile lacks lanceolate neck feathers; paler and browner than female; has less conspicuous spotting and rufous edges to many of the feathers of mantle and wing.

Habitat. Tall evergreen and semi-evergreen hill forests of oak, *Rhododendron* and associated plants, within altitude range of 1800-4000 m. Sometimes to be seen in intervening open treeless valley bottoms, e.g. resting on rocks.

Food and Feeding. Mostly arboreal and frugivorous but also takes herbs, seeds and cereals on the ground; much of the diet consists of acorns, drupes and fruits of *Prinsepia utilis*; in the Himalayas has been observed feeding on acorns of brown oak (*Quercus semicarpifolia*) and *Ficus*. Feeds in pairs, trios or flocks of 6-10 birds.

Breeding. Breeding occurs mainly May-Jun but probably extends further into the summer at altitudes of 1800-3300 m. Nest consists of a platform of interlaced twigs placed 3-8 m up in an oak or other tree. Clutch is 1 white egg. No further information available.

Movements. Undertakes local and altitudinal movements according to food supply. Birds seen in N Thailand in winter may be migrants from further north.

Status and Conservation. Not globally threatened. A little known species; appears to be usually rather uncommon, although relative inaccessibility of much of range means that many data are essentially anecdotal. Reported to be common in Great Himalayan National Park, N India. Uncommon to occasional in Nepal. Status in extensive Chinese sector of range unknown.

Bibliography. Ali & Ripley (1981), Baker (1913), Étchécopar & Hùe (1978), Inskipp & Inskipp (1991), Li Youlin (1960), Ludlow (1937, 1944), Meyer de Schauensee (1984), Ripley (1982), Roberts, T.J. (1991), Rösler (1996), Round (1982), Smythies (1986), Yang Lan *et al.* (1995).

19. White-naped Pigeon

Columba albinucha

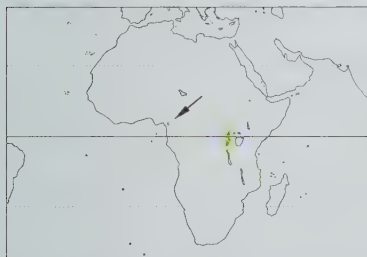
French: Pigeon à nuque blanche

German: Weißgenicktaube

Spanish: Paloma Nuquialba

Taxonomy. *Columba arquatrix albinucha* Sassi, 1911, Moera, near Fort Beni, north-east Zaire. Somewhat distantly related to the *C. arquatrix* superspecies. Monotypic.

Distribution. E Zaire and W Uganda, around Ruwenzori Mts; also Rumpi Hills in W Cameroon.



Descriptive notes. 34 cm; 280-290 g. Resembling of partially sympatric *C. arquatrix*, but smaller and distinguished by large white nuchal patch; crown and lores purplish maroon; nape and hindneck as far as eye white; throat and sides of neck ash grey, darker on face; chin white; upper mantle dark purple with grey fringes, giving impression of scales; mantle purple, back, rump and uppertail-coverts slate, faintly scaled; tail brown basally, pale grey terminally, with central rectrices dark, lighter at base; breast ash-grey; belly dark purple, with two whitish spots on each feather; vent dark grey, paler on undertail-coverts; primaries and secondaries slaty brown; wing-coverts and underwing slate; iris buff or yellow with orange-red outer ring; orbital skin narrow and yellowish; bill purplish black basally, yellow or red at tip; legs red to purplish red. Female with pale grey nuchal patch, vinous-grey breast and greyish purple mantle. Juvenile with greyer head; dark earth-brown upperparts; mantle feathers with rusty fringes and blue-grey uppertail-coverts; breast feathers dark brown fringed with pale rufous; belly grey fringed with rufous; tail grey, pale at tip.

Habitat. A bird of dense lowland forest and forested slopes; in E Zaire occurs up to 1500 m, in Uganda in altitude range of 700-1800 m, and in Cameroon up to 1100 m.

Food and Feeding. Takes fruit and berries which it plucks from trees in the canopy or at mid-level; rarely descends to the ground. No precise details on food.

Breeding. Breeding condition bird collected in Feb, Cameroon. A nest containing 1 white egg was found in secondary growth in a forest clearing. No further information available.

Movements. Resident.

Status and Conservation. Not globally threatened. Currently considered near-threatened. Generally judged to be rather scarce throughout range; very restricted distribution leaves species highly vulnerable to habitat loss. Only three records in Cameroon. Similarity of birds from highly disjunct W & E populations supports the suggestion that range of species may have contracted notably since cooler, wetter conditions of geologically recent past.

Bibliography. Britton (1980a), Chapin (1939), Dowsett & Forbes-Watson (1993), Eisentraut (1968), Fry (1986), Lippens & Wille (1976), Louette (1981), Mackworth-Præd & Grant (1957, 1970), Nikolaus (1987), Prigione (1971), Rösler (1996), Serle (1965), Short *et al.* (1990), Snow (1978), Urban *et al.* (1986), Williams, E. (1995).

20. Ashy Woodpigeon

Columba pulchricollis

French: Pigeon cendré

German: Himalayataube

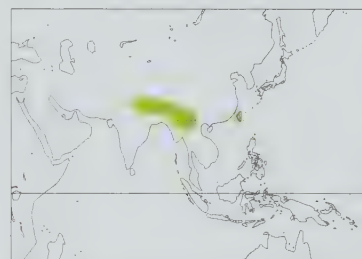
Spanish: Paloma Cenicienta

Other common names: Buff-collared Pigeon, Nepal Woodpigeon

Taxonomy. *Columba pulchricollis* Blyth, 1846, Nepal.

Forms a superspecies with *C. elphinstonii* and *C. torringtoni*. Monotypic.

Distribution. Tibet, Nepal, Sikkim and Assam to Myanmar, Thailand, CS China (Yunnan) and Taiwan.



Descriptive notes. 31-36 cm; 330 g. Head bluish grey merging into white throat; broad neck collar, wider at back and narrowing at sides, consisting of black feathers with shiny buff or cream tips, which gives a spotted impression when neck is stretched; rest of neck and upperparts bluish grey with some green iridescence; purplish on upper neck, mantle and upper breast; lower breast lighter grey merging into paler or buffish vent; undertail-coverts buffish white; primaries and rectrices greyish black; iris white, greyish white or pale yellow; orbital skin grey; bill dull green distally, purplish basally; legs purplish to coral red, claws horny brown. Female slightly duller, breast with some brownish buff suffusion. Juvenile duller still; breast, underparts and some wing-coverts with rusty buff edges to feathers; neck markings barely noticeable.

Habitat. A forest species inhabiting mixed deciduous and evergreen forests of oak, chestnut and rhododendrons. Usually found at 1200-3200 m in Himalayas, but in Bengal recorded as low as 100-150 m during all seasons of the year.

Food and Feeding. Mostly frugivorous and arboreal; also feeds on seeds and grain, acorns, cardamom berries and small snails. Feeds as individuals, pairs, or flocks of 10-30 birds.

Breeding. Known to breed May-Aug. Untidy nest of twigs placed fairly low in tree; said by one observer to be lined with some feathers. Typical clutch apparently 1 white egg, but clutches of 2 have been found in Sikkim; incubation 21-23 days; nestlings fledge within 4 weeks.

Movements. Known to be a wanderer, following good fruit crops. Possibly undertakes altitudinal movements, but details unclear.

Status and Conservation. Not globally threatened. Limited information available, but species appears to be rare and secretive throughout its mostly rather remote range. Threatened by deforestation in Thailand, where it is at the edge of its range.

Bibliography. Ali (1962), Ali & Ripley (1981), Baker (1913), Beaman (1994), Deignan (1945), Étchécopar & Hùe (1978), Inskipp & Inskipp (1991), Lekagul & Round (1991), Lightfoot (1936), Meyer de Schauensee (1984), Narayan & Rosalind (1991a), Ripley (1982), Robson (1996c), Rösler (1996), Round (1988), Severinghaus & Blackshaw (1976), Smythies (1986), Yang Lan *et al.* (1995).

21. Nilgiri Woodpigeon

Columba elphinstonii

French: Pigeon d'Elphinstone

German: Nilgiritäube

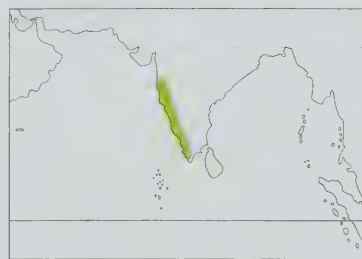
Spanish: Paloma de los Nilgiris

Other common names: Spotted Woodpigeon

Taxonomy. *Ptilinopus Elphinstonii* Sykes, 1833, the Ghats of Deccan, India.

Forms a superspecies with *C. pulchricollis* and *C. torringtoni*. Monotypic.

Distribution. Western Ghats of SW India, from S Maharashtra to Kerala and W Tamil Nadu.



Descriptive notes. 36-42 cm; 379 g. Head bluish grey merging into darker neck and breast; belly and undertail-coverts admixed with some brown; hindneck of black feathers with white tips forms a broad, spotted, chequered half-collar; green iridescence on hindneck behind collar merges into purple or brownish purple iridescence on mantle; back, scapulars, inner wing-coverts, rump and uppertail-coverts slate or brownish purple, most feathers fringed with brownish purple; rest of upperparts and tail black; iris greyish brown or bright khaki; cere and basal half of bill magenta, distal half ivory-white; legs magenta, claws ivory. Female slightly duller, with purplish on upperparts reduced, and blue-grey of head admixed with brown. Juvenile duller than adult with neck ornaments less developed and wing-coverts fringed with rusty reddish brown.

Habitat. Moist evergreen forests from foothills up to 2000 m; breeding usually takes place at altitudes above 1000 m.

Food and Feeding. Mostly frugivorous, feeding arboreally on fruits, berries and buds; also descends to the forest floor to take fallen berries and snails.

Breeding. Season extends Mar-Jul, but mostly Apr-Jun. Nest is the typical pigeon platform of twigs. Clutch is 1 white egg.

Movements. Much wandering takes place, with birds following ripening fruit crops.

Status and Conservation. Not globally threatened. Currently considered near-threatened. Appears to be rather rare and local within rather limited range. Species is poorly known, although this is probably due in part to its retiring habits. Research desirable.

Bibliography. Ali (1996), Ali & Ripley (1981), Baker (1913), Collar & Andrew (1988), Daniel & Amladi (1974), Gole (1996), Jerdon (1863), Ripley (1982), Saha & Dasgupta (1992).

22. Sri Lanka Woodpigeon

Columba torringtoni

French: Pigeon de Ceylan

German: Ceylontaube

Spanish: Paloma de Ceilán

Other common names: Ceylon Woodpigeon

Taxonomy. *Palumbus Toringtoni* Bonaparte, 1854, Sri Lanka.

Forms a superspecies with *C. pulchricollis* and *C. elphinstonii*. Monotypic.

Distribution. Sri Lanka, occurring mainly in the hill country of the interior.



Descriptive notes. 33-36 cm. Head purplish grey, some purplish iridescence on hindcrown and nape; throat white; chequered black and white collar similar to that of *C. elphinstonii*; back slaty; beneath collar, large area of purple or green iridescence merging into greyish purple on breast; below breast purplish grey or purplish; undertail-coverts greyish; mantle, back and wings slaty, primaries and tail slightly lighter; iris pale red or pink; orbital skin dull pink; legs pinkish, toes and soles of feet redder. Female with little or no grey tinge on head and breast; shows coppery lustre in purple of breast and lower part of hindneck. Juvenile

duller and browner; purplish grey of adult replaced by dull grey with reddish edges to feathers; purple of adult with faint black and rust brown bars; wing-coverts fringed with rust; display neck plumage black with iridescent greenish grey tips.

Habitat. Both evergreen and moist deciduous forests, usually above 1000 m, but sometimes wandering as low as 300 m.

Food and Feeding. Apparently feeds mostly on fruits and berries taken from branches.

Breeding. Season extends Feb-Nov, but most nesting takes place in Oct. Nest is a flimsy structure of twigs in a tree or shrub. Clutch is 1 egg.

Movements. Known to wander in search of food.

Status and Conservation. VULNERABLE. Once common in some areas but has declined considerably; still fairly frequent in places. The population has suffered in the face of loss and degradation of habitat: native forests being replaced by monocultures unsuitable for this species, and this may well be chief cause of decline; a few observations of birds in wooded areas around villages suggest species might be capable of partially adapting to some less degraded man-made habitats. Survival of species will depend on preservation of remaining natural habitat with adequate fruiting trees.

Bibliography. Ali & Ripley (1981), Baker (1913), Collar & Andrew (1988), Collar *et al.* (1994), Henry (1971), Kotagama & Fernando (1994), Legge (1880), Phillips (1978), Ripley (1982), Rösler (1996), Wait (1925), Wijesinghe (1994).

23. Pale-capped Pigeon

Columba punicea

French: Pigeon marron

German: Kupfertaube

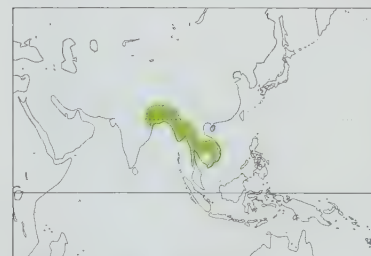
Spanish: Paloma Purpúrea

Other common names: Chestnut/Purple Pigeon, Red Woodpigeon

Taxonomy. *Columba (Alsocomus) puniceus* Blyth, 1842, Chyebassa.

Related to the *C. elphinstonii* superspecies, and perhaps also allied to *C. argentina*. Monotypic.

Distribution. S Tibet and E India (W to E Madhya Pradesh) through Bangladesh, Myanmar and Thailand to Hainan, S Laos and C & S Vietnam (Annam, Cochinchina).



Descriptive notes. 36-41 cm; 370-510 g. Forehead, crown and nape silvery grey, forehead notably sloping in profile; throat and neck brown with coppery iridescence merging into duller purplish brown on underparts; sides and back of neck iridescent purplish pink and bronze green; mantle, back, upper rump and most wing-coverts rich purplish chestnut, new feathers dark reddish chestnut fringed with iridescent purple; lower rump greyish black, all feathers with green and purple iridescence; uppertail- and undertail-coverts dark grey; inner secondaries and greater coverts dusky chestnut; primary coverts, primaries and outer

secondaries black; tail black; iris creamy yellow, yellow-brown, orange-yellow or orange-red; orbital skin greyish magenta or purplish, eye rim brighter; cere and base of bill magenta, rest ivory or pale horn; legs crimson magenta or purplish red with pale yellow or white claws. Female somewhat smaller and duller; grey areas of head darker and suffused with some brown, purple or lilac gloss. Juvenile duller and browner, wing-coverts and scapulars with rufous margins.

Habitat. A forest species, occurring from the plains up to 1600 m; in SE Asia recorded only up to 1280 m. Found in evergreen forest tracts interspersed with scrub jungle and cultivated areas, as well as in wooded ravines; also inhabits mangrove swamps in some areas. Recently recorded feeding on fruiting trees in overgrown cultivation.

Food and Feeding. Takes wild figs, fruits, berries such as *Litsaea nitida*, bamboo seeds and various kinds of grain. Usually observed as single individuals, but sometimes occurs in small parties; groups of 30-40 may converge on a fruiting tree or grove of seeding bamboos; feeds in trees and on the ground.

Breeding. May-Aug, with a peak in Jul. Nest is a flimsy structure of twigs placed low down, usually less than 6 m above ground, in a tall bush or in bamboo. Clutch 1 white egg, rarely 2. No further information available.

Movements. Habits not well understood; species appears essentially to be resident, though may make seasonal nomadic movements dependent on food supply.

Status and Conservation. VULNERABLE. Widespread but extremely locally distributed; always reported as being uncommon and is now rare throughout much of range. Appears still to be locally frequent in parts of Vietnam, with several recent records, including 41 birds on a fruiting tree near Da Lat in Jan 1992; several other records of smaller flocks. Status uncertain in Bangladesh, where known since 19th century; only 3 recent records of 2-3 birds, all in West Bhanugach Forest Reserve, Srimangal (NE Bangladesh), in 1988/89, and these might have been strays from neighbouring Assam or Manipur. Elsewhere, recent records from Dibru Saikhowa Wildlife Sanctuary in Assam, in 1993, a site where human pressure is intense; and Thailand, where species considered uncommon to rare. Threatened by deforestation; also captured in places for wild bird trade.

Bibliography. Ali (1996), Ali & Ripley (1981), Baker (1913), Chitampalli (1977), Collar & Andrew (1988), Collar *et al.* (1994), Crosby (1995a, 1995b), Eames (1995), Eames & Robson (1992), Jayakar (1967), Lekagul & Round (1991), Medway & Wells (1976), Meyer de Schauensee (1984), Ripley (1982), Robinson & Chasen (1936), Robson *et al.* (1993b), Round (1988), Smythies (1986), Thompson *et al.* (1993), Wells (1985).

24. Silvery Pigeon

Columba argentina

French: Pigeon argenté

German: Silbertaube

Spanish: Paloma Plateada

Other common names: Silver Pigeon, Silvery/Grey Woodpigeon

Taxonomy. *Columba argentina* Bonaparte, 1855, Malaysia and Borneo.

Probably related to *C. pulchricollis* and allied species, possibly including *C. punicea*. Monotypic.

Distribution. Simeulue and Mentawai Is (Sipura, South Pagai); Riau (Karimun Besar, Batam, Bintan) and Lingga (Saya) Archipelagos; Anambas Is, North Natunas and Karimata Is (off W Borneo). Exceptionally recorded in lowlands of mainland Borneo and possibly Sumatra. Formerly also on Burong I (Malaysia), where now extinct.



Descriptive notes. 34-38 cm. Mostly very pale bluish grey with black primaries and secondaries; tail greyish white on basal half, black distally; hint of green iridescence on hindneck; iris reddish brown, orange-brown, orange or yellow; orbital skin dark red; bill brownish or purplish at base with pale green or yellowish green tip; legs grey with red tinge or blotching. Female slightly darker and less silvery than male when both in fresh plumage. Juvenile with sandy buff breast and sandy buff edging to feathers.

Habitat. Mangroves, woodland, coconut groves in lowlands and hills. Mostly on small islands around Sumatra and Borneo but very rarely on the mainland coast below 100 m.

Food and Feeding. No information available.

Breeding. Season unknown. Typical pigeon nest placed in a tree or shrub. Clutch 1 white egg, rather chalky in texture. Species found breeding in large numbers with *Ducula bicolor* on Burong I in 1899.

Movements. Known to disperse between islands in response to alterations in food supply.

Status and Conservation. VULNERABLE. Once locally common, but has undergone a catastrophic decline, and there have been no recent reliable records, as possible confusion with superficially rather similar *D. bicolor* frequently frustrates confirmation of identification. Now extinct on Burong I. No definite records from mainland Sumatra, although several possible sightings down SE coast in recent years; not recorded in recent surveys of Batam and Bintan, and no recent records from islands off W Sumatra. Probably threatened by hunting and deforestation; disturbances associated with industrial and other development in this region may also pose a serious threat to the species. Urgently requires study, and probably deserves a higher IUCN conservation status.

Bibliography. Andrew (1992), Chasen (1935), Collar & Andrew (1988), Collar *et al.* (1994), Gibson-Hill (1952), Holmes (1994a, 1996), MacKinnon & Philipps (1993), van Marle & Voous (1988), Rajathurai (1996), Robinson & Chasen (1936), Rösler (1996), Smythies (1981), Verheugt *et al.* (1993), Wells (1985).

25. Andaman Woodpigeon

Columba palumboides

French: Pigeon des Andaman

German: Andamanentaube

Spanish: Paloma de Andamán

Taxonomy. *Carpophaga palumboides* Hume, 1873, Port Mouat, Andaman Islands.

Possibly related to *C. pulchricollis* and relatives; said by some to form a link with the *C. vitiensis* species-group. Monotypic.

Distribution. Andaman and Nicobar Is.



Descriptive notes. 36-41 cm; 510-520 g. Head and neck silvery grey, merging into darker grey with green gloss on upper mantle and light grey on breast; rest of upperparts black; upper mantle with green gloss, feathers on rest of mantle, back and rump with iridescent purple and green fringes; flanks and undertail-coverts dark grey; iris with dark orange or red outer ring and inner ring of yellow or orange; orbital skin purplish red; legs red or pink, claws white; bill purplish red basally and greenish white or pale yellow distally. Female has head and neck darker and less silvery. Juvenile mostly brownish grey and brownish black with little or no

iridescence.

Habitat. Forest; generally seen in pairs or small groups in dense parts of forest.

Food and Feeding. Fruits, especially figs and berries appear to be main food items; walnut-sized fruits have been found in crops.

Breeding. No information available.

Movements. Readily moves from island to island, flying high across the straits; moves in response to fruiting of trees.

Status and Conservation. Not globally threatened. Currently considered near-threatened. Reported to be not uncommon; nevertheless, only limited evidence available and this, combined with very small size of range and apparent preference for thick forest, suggests species may well be vulne-

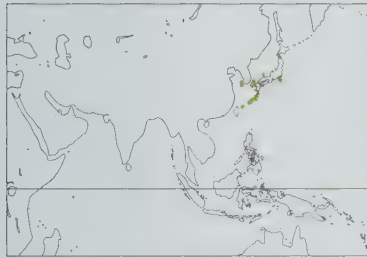
rable to habitat destruction. Research required into biology and ecology of the species; surveys desirable in order to establish population size and trends.
Bibliography. Abdulali (1967, 1978), Ali & Ripley (1981), Hume (1874), Ripley (1982), Rösler (1996), Tikader (1984).

26. Japanese Woodpigeon
Columba janthina

French: Pigeon violet **German:** Veilchentaube **Spanish:** Paloma Japonesa
Other common names: Black Pigeon/Woodpigeon

Taxonomy. *Columba janthina* Temminck, 1830, Japan. Belongs to a superspecies of dark-coloured, iridescent Asian and Australasian forms, including *C. vitiensis* and *C. leucomela*, and the extinct *C. versicolor* and *C. jouyi*; *C. pallidiceps* may also be related. Birds of S Ryukyu Is formerly awarded separate race, *stejnegeri*. Two subspecies recognized.

Subspecies and Distribution.
C. j. janthina Temminck, 1830 - small islands SW of South Korea and off Japan S through Ryukyu Is.
C. j. nitens (Stejneger, 1887) - Ogasawara (Bonin) and Iwo (Volcano) Is (almost certainly extinct).



Descriptive notes. 37-43.5 cm. Black all over, with conspicuous green iridescence on neck, and purple on head, mantle and rump; limited amounts of bronze, purple and green iridescence on wings and uppertail-coverts and none on primaries and rectrices; iris brown; bill greenish blue; legs red. Sexes alike. Juvenile duller with a rusty tinge on those areas that are iridescent purple in adult. Extinct race *nitens* differs in having a purplish brown head.

Habitat. Inhabits dense subtropical and warm temperate evergreen broadleaf forests on islands; known to be heavily dependent on mature forest.

Food and Feeding. Feeds mostly on *Camellia* seeds, but also takes other seeds, buds and fruits. Plucks seeds directly from trees, as well as taking them on the ground. Usually solitary, but sometimes forms small flocks.

Breeding. Season extends Feb-Sept, but eggs or young have even been recorded for late autumn and winter. Nest typically in hole in tree or among rocks; in Izu Is, nests are placed in trees. Lays 1 egg. No further information available.

Movements. Possibly a migrant in some parts of its range; birds have been found in mid-Oct on Hegura Juna in Sea of Japan.

Status and Conservation. Not globally threatened. Currently considered near-threatened. Still relatively common in Izu Is, although numbers have declined considerably since 1950's. Past presence on Honshu not definitely proven, but if species did ever occur there it is now fairly certainly extinct. Race *nitens* almost certainly extinct, having disappeared in 1980's; declared a "National Monument". Deforestation, notably on Okinawa, continues to be a serious threat; this has already led to extinction of the species on some islands. Heavy dependence on mature forest makes deforestation a particularly acute problem; unable to tolerate hunting pressure.

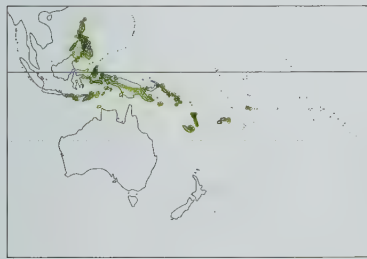
Bibliography. Austin & Kuroda (1953), Brazil (1991), Etchécopar & Hue (1978), Greenway, J.C. (1967), Jahn (1942), Rösler (1996), Sonobe (1982), Stepanyan (1990a), Ueta & Yamaguchi (1997), Won (1993), Yamashina (1961).

27. Metallic Pigeon
Columba vitiensis

French: Pigeon à gorge blanche **German:** Weißwangentaube **Spanish:** Paloma Gorgiblanca
Other common names: Grey-throated/Chili/White-throated Pigeon, Metallic Woodpigeon

Taxonomy. *Columba vitiensis* Quoy and Gaimard, 1830, Fiji. Belongs to a superspecies of dark-coloured, iridescent Asian and Australasian forms, including *C. janthina* and *C. leucomela*, and the extinct *C. versicolor* and *C. jouyi*; *C. pallidiceps* may also be related. Race *godmanae* of Lord Howe I extinct; validity uncertain, as no specimen exists, the description being based on a painting. Proposed race *mendeni* from Taliabu, Sula Is no longer regarded as valid. Eight subspecies recognized.

Subspecies and Distribution.
C. v. griseogularis (Walden & E. L. Layard, 1872) - Philippines, Sulu Archipelago, and islands off N Borneo.
C. v. anthracina (Hachisuka, 1939) - Palawan, probably Calauit, and possibly also some islands off N Borneo.
C. v. metallica (Temminck, 1835) - Lesser Sundas.
C. v. halmaheira (Bonaparte, 1855) - Banggai and Sula Is through Moluccas and W Papuan Is to New Guinea, then on to Louisiade Archipelago and Solomon Is.
C. v. leopoldi (Tristram, 1879) - Vanuatu.
C. v. hypoenochroa (Gould, 1856) - New Caledonia, I of Pines and Loyalty Is.
C. v. vitiensis Quoy & Gaimard, 1830 - Fiji.
C. v. castaneiceps Peale, 1848 - Western Samoa, on Savaii, Apolima, Manono and Upolu.



Descriptive notes. 37-41 cm; male 345-430 g, female 268-511 g. A large, dark, heavily built pigeon; back, wings and tail dark grey with variable amounts of greenish to purplish iridescence; chin, throat and cheeks pure white; forehead, crown, neck and underparts deep chestnut with a purple-pink gloss, to slaty brown with purple or green gloss; iris orange or red; feet and legs purplish red; orbital skin maroon; bill purplish red, or red with pale yellow tip. Sexes alike or nearly so, with female typically slightly duller than male. Juvenile similar to adult but duller, with little or no iridescence to underparts. Races differ most notably in amount of iridescence, most prominent in *metallica* and *halmaheira*, least so in *castaneiceps*; throat grey in *griseogularis* and *metallica*.

Habitat. Occurs in a wide variety of forest types, from lowlands to cloud forest, reaching 2750 m in Papua New Guinea. Occurs principally in lowlands in Wallacea. In many areas, adapts to disturbed habitats and is encountered in young secondary forest, agroforest, clearings and village gardens.

Food and Feeding. Fruits, buds, and seeds; also reported to take caterpillars and snails. Typically forages in bushes and trees, but sometimes feeds on the ground. Wild chilis (*Capsicum*) and the berries of *Solanum* (both Solanaceae) are reported to be favourite foods. Occurs singly, in pairs or in small groups of up to 30 birds, and has been reported forming mixed-species roosting flocks with other pigeon species e.g. *Ducula mindorensis* and *D. poliocephala*. One flock observed feeding on piles of dried, ground coconut flesh at a coconut-oil factory on Vanua Levu, Fiji; also reported to feed on cultivated rice in Fiji, if other foods unavailable.

Breeding. Little information on season except from Vanuatu, where species breeds Sept-Feb, occasionally Jul-Aug; a nestling taken in May on Batan, N Philippines; and a female in breeding condition on Flores in late Jun. Flimsy platform of bare twigs, usually 3-8 m up in trees, but sometimes on the ground in thick vegetation. Usually 1 pure white egg, but at E edge of range 2 eggs sometimes reported. In captivity: incubation 17-19 days; fledging 21 days, at which time the young can fly strongly.

Movements. Apparently somewhat nomadic, undertaking irregular local movements in search of food. Some evidence of inter-island movements, e.g. to and from Sipadai I (off NE Borneo). Flight strong and direct, with steady flapping wingbeats.

Status and Conservation. Not globally threatened. Apparently relatively uncommon or rare throughout much of its range, e.g. only 1 record from E Highlands of New Guinea, but no evidence of serious declines amongst extant races. Race *godmanae* was formerly abundant and tame on Lord Howe I, but was slaughtered by human settlers and sailors using guns, sticks and stones, until finally extirpated in 1853. Species is common and conspicuous in Fiji; local and generally uncommon in Western Samoa; locally common on islands of Tiga, Mantanani and Maratua, off Borneo. Partly protected by law in Vanuatu, where can be legally hunted Apr-Jun inclusive.

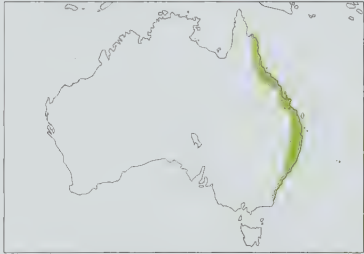
Bibliography. Amadon (1943), Armstrong (1932), Beehler *et al.* (1986), Beichele (1989, 1991b), Bregulla (1992), Cain & Galbraith (1956), Clunie (1978, 1984), Coates (1985), Coates & Bishop (1997), Dickinson *et al.* (1991), Garnett (1993), Hannecart & Létocart (1980), Higgins & Davies (1996), Holyoak (1979), Jepson (1993), King, B. (1990), MacKinnon & Philipps (1993), Mayr (1945b), Newman (1910b, 1912), Peckover & Filewood (1976), Rand & Rabor (1960), Rutgers & Norris (1970), Smythies (1981), Tarburton (1992), Warner (1949), Watling (1982a), Wells (1985), White & Bruce (1986), Wood & Wetmore (1926).

28. White-headed Pigeon
Columba leucomela

French: Pigeon leucomèle **German:** Weißbrusttaube **Spanish:** Paloma Blanquiegra
Other common names: Baldy/Cook/Bally Pigeon, White-headed Fruit-pigeon

Taxonomy. *Columba leucomela* Temminck, 1821, south Queensland, Australia. Belongs to a superspecies of dark-coloured, iridescent Asian and Australasian forms, including *C. janthina* and *C. vitiensis*, and the extinct *C. versicolor* and *C. jouyi*; *C. pallidiceps* may also be related; most closely allied with *C. vitiensis*. Long known as *C. norfolciensis*, based only on a dubious description; however, an 18th century watercolour "discovered" in 1953 showed that this name actually applied to another bird that formerly occurred on Norfolk I, possibly *Chalcophaps indica*. Monotypic.

Distribution. E Australia, from Cooktown (Queensland) to Hunter R (New South Wales), in coastal regions and adjacent highlands.



Descriptive notes. 38-42 cm; c. 420 g. Head, neck, breast and belly white, sometimes with buffy tinge, becoming slate grey on flanks, vent and undertail-coverts; upperparts slate black with metallic green or purple sheen to mantle, rump, uppertail and secondary coverts; bill pale to dark red, with yellow-white tip; legs and feet pink-red. Female similar to male, but white areas mottled or smudged light grey. Juvenile similar to female, but with more defined grey cap, often more uniform and darker grey on underparts, contrasting with white of chin, throat and sides of neck; bill dark reddish brown, with white tip; legs and feet reddish grey.

Habitat. Rain forest, gallery forest and sometimes open country with scattered forest patches. Most frequent at forest edge, and often in second growth. Inhabits cleared agricultural country with abundant camphor laurel (*Cinnamomum camphora*) trees.

Food and Feeding. Feeds on fruits and seeds. Has a muscular gizzard capable of digesting hard seeds. Relatively few data on diet: important plant families include Lauraceae (including the introduced camphor laurel), Euphorbiaceae, Rutaceae, Rhamnaceae and Myrtaceae. Feeds quietly alone or in small groups, from canopy to low understorey, and occasionally on the ground.

Breeding. Season apparently extended, based on limited data. At least 2 successive broods are sometimes reared in the same nest. Nest is flimsy platform of twigs and vine tendrils, placed in thick foliage or among vine tangles, 2.5-20 m up. 1 white egg; incubation 19-20 days; on hatching, young is covered in rust-coloured down, and weighs c. 17 g; chick attains full juvenile plumage by 20 days; fledging c. 21-22 days.

Movements. Nomadic, in response to fruit availability. Little detailed information, but species may disappear from an area for months, returning again when fruit is available. In some areas, moves into more open country in winter, to feed on introduced camphor laurels.

Status and Conservation. Not globally threatened. Formerly shot in great numbers, species was protected from hunting in 1950's. Although never abundant, numbers appear to have increased since 1940's, following decline c. 1860-1900, during period of extensive clearance of rain forest; some range expansion has occurred in S part of its range in recent years. Adapts to secondary forest and forest edge, and readily feeds on the introduced camphor laurel tree. The only population estimate available is of over 7000 birds for New South Wales.

Bibliography. Blakers *et al.* (1984), Crome (1975a), Date *et al.* (1991), Frith, H.J. (1952a, 1977, 1982), Higgins & Davies (1996), Hyem (1936), Innis (1989), Lindsey, T.R. (1992), Macdonald (1983), Pizzey & Doyle (1980), Schodde & Tidemann (1986), Simpson & Day (1996), Tronson & Tronson (1987).

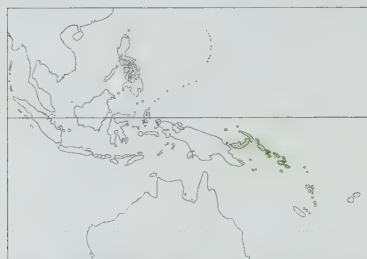
29. Yellow-legged Pigeon
Columba pallidiceps

French: Pigeon à tête pâle **German:** Gelbfußtaube **Spanish:** Paloma Cabeciclara

Taxonomy. *Ianthanas pallidiceps* E. P. Ramsay, 1877, Duke of York Island.

Apparently closely related to *C. vitiensis*, with which it is sympatric in some places. Monotypic.

Distribution. Bismarck Archipelago (New Britain, Duke of York, New Ireland) and Solomon Is.



Descriptive notes. 36-38 cm; 1 male 459 g. Entire head silvery grey. General coloration black above; slaty black below, feathers edged with brilliant pink, purple and green iridescence; iris yellow or orange; bill purplish red with yellow tip; feet and legs yellow to yellow-orange. Female has head duller silvery grey than male. Juvenile has head brownish black with buff feather tips (silver in adult); iridescence on wing-coverts and underparts reduced.

Habitat. Primary forest and forest edge in lowlands and hills, up to 1300 m on Guadalcanal and to 600 m on Makira.

Food and Feeding. Known to consume fruits and seeds. Often observed feeding on the ground.

Breeding. No information available.

Movements. No information available.

Status and Conservation. **CRITICALLY ENDANGERED.** Few recent sight records: 1 bird seen on New Ireland in 1984; the first records from Solomons since 1928 were 1 bird on Guadalcanal in 1987, and 5 sightings on Makira in 1990. Said to be widespread but rare in the Solomons. Reckoned to be uncommon on New Britain in 1959, and in period 1978-1988 there were no records from W New Britain, despite 3 years of intensive fieldwork in 1978-1980; equally, no records from Bougainville in period 1979-1988. Unrecorded during recent surveys in New Ireland. Vulnerable to logging; hunting is possibly an additional threat on the coast near population centres.

Bibliography. Cain & Galbraith (1956), Coates (1985), Collar & Andrew (1988), Collar *et al.* (1994), Gilliard & LeCroy (1967a), Hadden (1981), Mayr (1945b), Rösler (1996).

30. White-crowned Pigeon

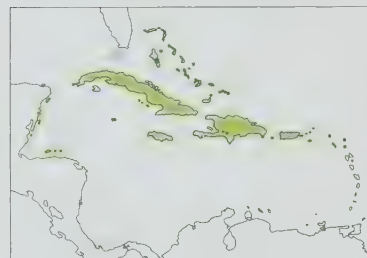
Columba leucocephala

French: Pigeon à couronne blanche **German:** Weißscheiteltaube **Spanish:** Paloma Coronita
Other common names: White-headed Dove, Baldpate

Taxonomy. *Columba leucocephala* Linnaeus, 1758, Bahamas.

Closely related to *C. squamosa*; although markings on head and neck are totally different, rest of plumage rather similar and songs spectrographically very close; the two overlap in parts of their ranges but tend to occupy different habitats. Monotypic.

Distribution. Florida Keys, Bahamas, Greater and Lesser Antilles as far S as Antigua; also Caribbean islands off coast of Central America, from Yucatán to NW Panama.



Descriptive notes. Male 29-40 cm, 210-309 g; female 29-39 cm, 200-267 g. Forehead and crown white; rest of body more or less slate grey; nape maroon to blackish brown; hind-neck bronzy green, feathers margined with black, producing a scaly effect; bill base red or brownish purple, tip white or sometimes slightly greenish; iris white; orbital skin white to pinkish; legs crimson, claws brown. Female slightly paler and duller. Young much duller, browner and less bluish throughout; entire hindneck dull greyish brown; crown greyish white at front to greyish at rear.

Habitat. In Florida Keys, is a bird of mangroves, but forages in hardwood forests. In Puerto Rico, occupies coastal rain forest characterized by royal palm (*Roystonea borinquena*), maguey (*Hernandia sonora*), water mampoo (*Pisonia subcordata*), maria (*Calophyllum calaba*), ausubo (*Manilkara bidentata*) and jacana (*Pouteria mytiliflora*), but also found in mangroves. On Mona I off Puerto Rico, formerly found on coastal plains covered with tall forests, also characterized by manchineel (*Hippomane mancinella*) and seagrape (*Coccoloba uvifera*); inhabited thick sclerophyll scrub consisting of Florida poison tree (*Metopium toxiferum*), gumbo limbo (*Bursera semiruba*), Dominican mahogany (*Swietenia mahoganii*), the cactus *Cephalocereus royeri*, prickly pear (*Opuntia catacantha*) and short-leaved fig (*Ficus critifolia*). Occupies lowlands, whereas *C. squamosa* occurs in highlands; in Jamaica, moves up to altitudes of 1500 m in summer.

Food and Feeding. An arboreal feeder, mostly foraging on fruits. In Florida Keys, feeds on flowers of black mangrove (*Avicennia germinans*) and fruit of Florida poison tree, blolly (*Guapira discolor*), strangler fig (*Ficus aurea*), short-leaved fig and black torch (*Erithalis fruticosa*). In Jamaica, feeds on *Bursera semiruba* in the lowlands and *Dipholis* at moderate altitudes.

Breeding. Season Apr-Aug. In Costa Rica 86.1% of nests found in black and red mangrove, but less frequent in white mangrove; in other areas birds use a variety of trees. Nests in colonies in some areas, e.g. Belize and Dominican Republic, but not in Puerto Rico. Usually 2 eggs, occasionally only 1; incubation 13-15 days (mean 13.8); fledging at 17-25 days old; crop milk is fed throughout the nestling period. One pair laid a new clutch 4 days after young fledged.

Movements. On Jamaica, moves up from lowlands to montane forests in summer. Wanders freely among islands; occurs irregularly as a wanderer down Lesser Antilles as far as St Lucia. Adults may fly as far as 44 km from breeding areas to feed.

Status and Conservation. Not globally threatened. Locally threatened over much of range, notably in Florida; decline is due to clearing of the hardwood forests on which it depends for its fruit. Still fairly common and widespread in Jamaica. Locally common in Dominican Republic, e.g. in Parque Nacional del Este. Populations require monitoring throughout range, in order to forestall more serious decline.

Bibliography. Arcendi *et al.* (1980), Bancroft (1992), Bancroft & Bowman (1994), Bancroft *et al.* (1990), Barbour (1943), Biaggi (1983), Blankinship (1977), Bond (1985), Bowman (1992), Buden (1987), Chamizo *et al.* (1983), DeGraaf & Rappole (1995), Dod (1987), Emlen (1977), Godínez (1992), Godínez & Fuentes (1987), Godínez & Oviedo (1995), Godínez *et al.* (1987), Gosse (1847), Gotelli & Abele (1982), Howell & Webb (1995a), Howell *et al.* (1992), Irwin (1975), Kocan & Sprunt (1971), Lack (1967), Monroe (1968), Nellis *et al.* (1984), Nicolai (1962), Norton & Seaman (1985), Owre (1978), Pregill & Olson (1981), Price *et al.* (1995), Raffaele (1989), Rappole & Blacklock (1994), Rappole *et al.* (1993), Ridgely & Gwynne (1989), Rivera-Milán (1992, 1996), Root (1988), Rutgers & Norris (1970), Sprunt (1977), Stiles & Skutch (1989), Stotz *et al.* (1996), Strong & Bancroft (1994), Strong *et al.* (1991, 1994), Watters *et al.* (1984), Wetmore (1968), Wetmore & Swales (1931), Wiley (1979, 1985c), Wiley & Wiley (1979).

31. Scaly-naped Pigeon

Columba squamosa

French: Pigeon à cou rouge

German: Antillentaube

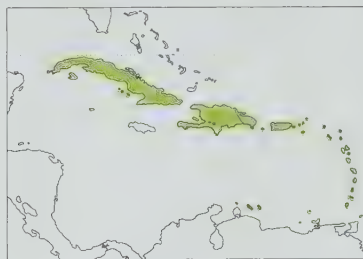
Spanish: Paloma Isleña

Other common names: Red-necked/Scaled(!)/Blue Pigeon

Taxonomy. *Columba Squamosa* Bonnaterre, 1792, Guadeloupe, West Indies.

Closely related to *C. leucocephala*; songs of the two species are spectrographically similar; they overlap in parts of their ranges but tend to occupy different habitats. In Jamaica, present species replaced by *C. caribaea*. Monotypic.

Distribution. Greater Antilles (except Jamaica) and Lesser Antilles; also Curaçao and Bonaire, and Los Testigos (off NE Venezuela).



Descriptive notes. Male 32.5-41 cm, female 34-39 cm; 250-326 g. A slate-coloured pigeon, darker on primaries and tail, paler below; head, upper neck and breast suffused with drab purple; nape purple-brown forming a shield or patch; hindneck metallic purplish changing to green or violet, these feathers with dark brown edges producing a scaly effect; iris is a ring of yellow bordered by a ring of scarlet; orbital skin red; bill red, white or yellowish at tip; legs red. Female similar to male but duller. Juvenile has feathers fringed with buff; purple and wine red areas of adult are reddish brown, while grey areas are replaced with brownish slate.

Habitat. Humid highlands, especially in rain forest, but may descend to arid lowlands on Barbados and elsewhere. In Hispaniola, present species occupies highlands and *C. leucocephala* lowlands; on Curaçao and Bonaire, co-exists with *C. corensis*, but again the two are separated altitudinally, latter occurring in lowlands. At Bridgetown, Barbados, occurs in the city. Large numbers have been observed associating with *C. leucocephala* at altitude of 2000 m in SE Haiti.

Food and Feeding. Various fruits, berries, buds, succulent leaves and small snails; seeds are digested along with the fruit. In Puerto Rico feeds on berries of various palms, wild legumes, wild figs, moral (*Cordia*) and jaqua (*Genipa americana*).

Breeding. Calling activity noted to start following availability of fruits of apple rose (*Syzygium jambos*). Nest usually in a tree, sometimes in shrub, or in hole or crevice in rocky cliff; in Netherlands Antilles may nest in *Rhizophora* and *Avicennia* mangroves. Clutch 1-2 white eggs. No further information available.

Movements. Specimens have been taken in Jamaica and in Florida Keys, indicating that birds sometimes undertake inter-island flights.

Status and Conservation. Not globally threatened. Declining on many islands due to hunting pressure, though precise details lacking for most of range. Presumably extinct on Aruba (Netherlands Antilles), where last reported in 1930, but two sightings reported in 1973; very scarce in Curaçao, where it occurs in hills west of the populated area, and also in extreme east.

Bibliography. Anon. (1983), Barbour (1943), Biaggi (1983), Bond (1962, 1985), Dod (1987), Faaborg & Winters (1979), Fleming (1982), Gotelli & Abele (1982), Hellmayr & Conover (1942), Keith (1997), Lack (1976), Lack *et al.* (1973), Meyer de Schauensee & Phelps (1978), Moreno-Brillón *et al.* (1986), Nellis *et al.* (1984), Olson & Angle (1977), Pérez-Rivera (1976, 1978), Raffaele (1989), Rivera-Milán (1990, 1992, 1995a, 1995b, 1996), Stotz *et al.* (1996), Terres (1982), Voous (1983), Wauer (1996), Wetmore & Swales (1931), Wiley & Wiley (1979), Wunderle (1985).

32. Scaled Pigeon

Columba speciosa

French: Pigeon ramiret

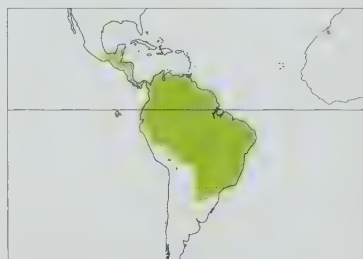
German: Schuppenbauchtaube

Spanish: Paloma Escamosa

Other common names: Dominick/Fair/Red-backed/Scallop-necked/Scab-necked/Splendid/Spotle-necked Pigeon

Taxonomy. *Columba speciosa* J. F. Gmelin, 1789, Cayenne. Appears to be related to *C. leucocephala* and *C. squamosa*, which exhibit some plumage similarities. Monotypic.

Distribution. S Mexico (Oaxaca and Veracruz) S through Central and N South America to E Peru, N & E Bolivia and S Brazil (Santa Catarina); also Trinidad.



Descriptive notes. Male 28-34 cm, 262 g; female 28-32 cm, 225-350 g. Head purplish to reddish brown; neck feathers blackish with white subterminal spots, fringes iridescent purple; mantle, back, rump and wing-coverts reddish purple; upper breast and hindneck golden brown with white subterminal spots fringed with coppery gold; lower breast and belly whitish, feathers fringed with purplish brown; primaries black, outermost webs white-fringed; uppertail-coverts purplish brown, undertail-coverts white with dark edges; tail black; eye-ring red, iris pale brown with outer ring of blue or dark purplish; bill bright red, tip white or yellowish; legs lavender to purplish red. Female similar but purplish chestnut replaced by dull brown on back, rump, scapulars and lesser wing-coverts; crown and sides of head less purplish brown; scaly markings less highly glossed. Juvenile male duller than adult with scaling and spotting almost absent; female similar to male but general colour more greyish brown.

Habitat. In Central America, found in humid evergreen and semi-deciduous forests, forest edges and clearings with tall trees. In Venezuela, occupies edge of rain forest, and also occurs in open forest and savanna areas with scattered trees; in Colombia, also found in gallery forest. In Costa Rica found from sea-level up to 1200 m; in W Panama and Santa Marta Mts of Colombia, ranges as high as 1524 m; in Guyana, ranges up to 1070 m; N of R Orinoco, it occurs up to 1400 m but S of the river up to 950 m only.

Food and Feeding. Plucks small fruit from tall trees and epiphytes; partial to melastome (*Hirtella*) fruit. A canopy species, which may occur in flocks of up to 100 birds, although in Valle del General, Costa Rica, most often encountered as singletons or pairs.

Breeding. Nest consists of a slightly concave platform of fine twigs and inflorescences placed in thickets 45-60 cm above ground level; interestingly, although present species tends to frequent

canopy, nests are usually placed low; a nest in Trinidad was found in bracken (*Pteridium aquilinum*) 60 cm above ground. Clutch size 2 on Trinidad, but 1 on mainland.

Movements. Known to withdraw from Yucatán Peninsula and areas N of Isthmus of Tehuantepec during Sept-Jan.

Status and Conservation. Not globally threatened. Fairly common to common from S Mexico to N Honduras; fairly common in Colombia. Declining in parts of Central America due to clearing of forests.

Bibliography. Binford (1989), Canevari *et al.* (1991), Contreras *et al.* (1990), ffrench (1980), Haverschmidt & Mees (1994), Hayes (1995), Hellmayr & Conover (1942), Herklots (1961), Hilty & Brown (1986), Howell & Webb (1995a), Land (1970), Lowery & Dalquest (1951), Meyer de Schauensee & Phelps (1978), Monroe (1968), Parker *et al.* (1995), de la Peña (1988), Ridgely & Gwynne (1989), do Rosário (1996), Rutgers & Norris (1970), Schubart *et al.* (1965), Short (1975), Sick (1985, 1993), Skutch (1964), Slud (1964), Snyder (1966), Stiles & Skutch (1989), Stotz *et al.* (1996), Tostain *et al.* (1992), Wetmore (1968).

33. Picazuro Pigeon

Columba picazuro

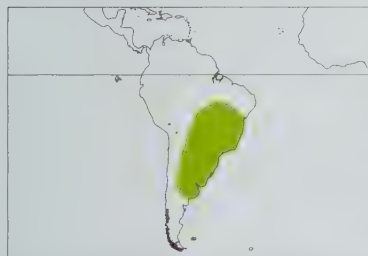
French: Pigeon picazuro **German:** Picazurotaube **Spanish:** Paloma Picazuró
Other common names: Argentine/Brown/Scaly-necked Woodpigeon

Taxonomy. *Columba Picazuro* Temminck, 1813, Paraguay.

Related to *C. maculosa*, with which it shares scaly pattern on plumage; possibly also related to *C. corensis*. Two subspecies recognized.

Subspecies and Distribution.

C. p. marginalis Naumburg, 1932 - NE Brazil (Piauí and Bahia, possibly Goiás).
C. p. picazuro Temminck, 1813 - E & S Brazil (from Piauí and Pernambuco W to Mato Grosso and S to Rio Grande do Sul) W to N, E & SE Bolivia (Beni, Santa Cruz, Tarija), and S to SC Argentina (La Pampa and rarely Río Negro).



Descriptive notes. 34 cm; 402 g. Head, nape and upper breast pinkish purple merging to paler on lower breast and belly; flanks, uppertail- and undertail-coverts and underwing dark bluish grey; feathers of back, sides of neck and upper mantle with iridescent black edges forming scaly effect, individual feathers with subterminal bands of greenish silver; lower mantle, inner secondaries and inner wing-coverts dull brown with paler edges to feathers; white line evident on closed wing due to white-fringed bluish grey feathers on outer greater and median coverts, appearing as white band on open wing; tail dark blue-grey with incon-

spicuous black terminal band; iris varies from orange to red, with narrow grey inner ring; orbital skin red suffused with powdery white; cere white, bill dark red basally with yellow tip; legs dark red. Female paler and duller, greyish on top of head and purple of lower breast and underparts of male replaced by dull buffish. Juvenile similar to female but duller and paler with spotting on back of neck less conspicuous. Race *marginalis* smaller, with paler upperparts, especially rump and uppertail-coverts; broader white edging to wing-coverts; rosy tinge below.

Habitat. Woodland, groves and gallery forest; also dry *caatinga* vegetation of NE Brazil, and cultivation in Argentina. Readily invades deforested areas, and has begun to exploit urban areas. Frequently on ground.

Food and Feeding. Poorly known. Takes seeds, buds, berries and young leaves; also some insects. Feeds on the ground as well as in trees.

Breeding. Recorded in Oct and Dec in S Brazil; all year round in Argentina. Builds typical pigeon nest in tree or shrub. Usually only 1 (white) egg per clutch, but clutches of 2 have been reported. No further information available.

Movements. Ringing studies in Poconé, Mato Grosso (WC Brazil), have revealed that birds migrate to the Paraguayan Chaco. Flocks of up to 200 birds or more have been recorded.

Status and Conservation. Not globally threatened. Few data available, but species reported to be expanding its already extensive range in Brazil and Argentina, in conjunction with continuing deforestation; common in most of range in Argentina. Reported to be poisoned as a crop pest in parts of Brazil, though full extent of this persecution not established.

Bibliography. Babarskas *et al.* (1996), Belton (1984), Bucher & Nores (1988), Canevari *et al.* (1991), Carman (1975), Chebez (1992), Contreras *et al.* (1990), Gibson (1880), Goodwin (1964), Guix (1995), Hayes (1995), Hellmayr & Conover (1942), Klimaitis & Moschione (1987), Narosky & di Giacomo (1993), Nellar (1993), Nores *et al.* (1983), de la Peña (1988), do Rosário (1996), Rutgers & Norris (1970), Schubart *et al.* (1965), Short (1975), Sick (1985, 1993), Steinbacher (1962), Stotz *et al.* (1996), Wetmore (1926), Willis (1992).

34. Bare-eyed Pigeon

Columba corensis

French: Pigeon jounud **German:** Nacktaugentaube **Spanish:** Paloma Aliblanca
Other common names: White-winged Pigeon

Taxonomy. *Columba corensis* Jacquin, 1784, Coro, Venezuela. Based on plumage similarities, believed to be relative of *C. picazuro*, and thus presumably also *C. maculosa*; however, vocalizations, which tend to be conservative within related New World *Columba*, are quite different; relationships deserve careful re-evaluation. Formerly listed as *C. gymnoptalmos*. Monotypic.

Distribution. Caribbean coast of Colombia and Venezuela, as well as nearby islands of Aruba, Curaçao, Bonaire, Margarita and Blanquilla.



Descriptive notes. Male 32-37 cm, female 30-34.5 cm; c. 274 g. Head, neck and breast mauve-pink; blue-grey tinge on top of head; chin, ventral regions and undertail-coverts white; feathers on back of neck edged with pinkish bronze black bands, followed by pale brown fringes, giving scaled effect; broad white patch at edge of closed wing formed by white edging on outer wing-coverts and inner secondaries; lower back, rump and uppertail-coverts pale bluish grey; primaries and outer secondaries black with narrow white edges; iris orange to orange-brown; prominent papillae bare orbital skin reddish brown with a narrow blue inner ring; bill pinkish white;

legs red. Sexes alike. Juvenile paler and duller; hindneck with pale subterminal bars.

Habitat. Generally found in arid lowlands, but may ascend to as high as 400 m in both Colombia and Venezuela. Habitat characterized by thorn-scrub, cactus (especially organ-pipe types) and acacia; also inhabits mangroves and cultivated areas. On Curaçao and Bonaire co-exists with *C. squamosa*, but latter tends to occupy highlands.

Food and Feeding. Takes various seeds and fruits, peas of various legumes, pods of acacia, dividivi, tamarind, fleshy fruits of bellissima (*Antigonon leptopus*) and mesh apple (*Achras sapota*). Sometimes feeds on ground, but most foraging is in trees and shrubs.

Breeding. Breeding appears to be triggered by rain; nests with eggs or young recorded in Jan, Mar and Apr on Curaçao and Bonaire. Nest is a frail, transparent platform of twigs, so thin that eggs can be seen from below, in tree or shrub; in Netherlands Antilles, *Rhizophora* mangroves, tamarind or dense thorn-scrub are typically used. Clutch is single white egg. Young able to breed by 5 months old.

Movements. Sedentary, but numbers may fluctuate locally in response to rainfall. Small flocks regularly cross to and fro between Netherlands Antilles and Venezuelan coast, notably coming to mainland when local millet crop has ripened.

Status and Conservation. Not globally threatened. Heavily hunted and therefore shy and timid, but appears to be relatively secure. In Colombia, common in arid brush and scrub of Guajira, and fairly common in eastern portion of Isla de Salamanca National Park; local west of Santa Marta massif.

Bibliography. Dunning (1982), Friedmann & Smith (1955), Hellmayr & Conover (1942), Hilty & Brown (1986), Lack (1976), Meyer de Schauensee (1982), Meyer de Schauensee & Phelps (1978), Rutgers & Norris (1970), Stotz *et al.* (1996), Voous (1957, 1983), Whitman (1919a).

35. Spot-winged Pigeon

Columba maculosa

French: Pigeon tigré **German:** Fleckentaube **Spanish:** Paloma Moteada
Other common names: (American) Spotted/White-winged Pigeon

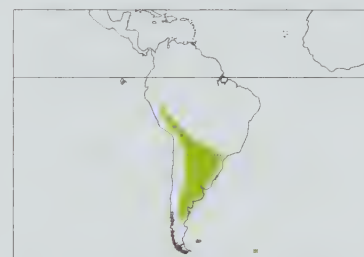
Taxonomy. *Columba Maculosa* Temminck, 1813, Paraguay.

Related to *C. picazuro*. Two subspecies recognized.

Subspecies and Distribution.

C. m. albipennis P. L. Selater & Salvin, 1876 - C Peru (Lima) S to W & C Bolivia and extreme NW Argentina (N Jujuy).

C. m. maculosa Temminck, 1813 - extreme S Bolivia, Paraguay, SE Brazil and Uruguay S to SC Argentina.



Descriptive notes. 33 cm; 308-345 g. Fore-head, crown, nape, hindneck and breast predominantly dull purplish pink; rest of head and underparts grey, slightly tinged with purplish pink except on flanks, belly and undertail-coverts; mantle and wing-coverts dark brown, each feather with a creamy-white triangular spot on tip, giving spotted effect; outer greater coverts bluish grey, outermost with white edges; primaries and secondaries black with narrow white edges; underwing pale grey; lower back, rump and uppertail-coverts bluish grey, some feathers pale-tipped; tail dark grey with inconspicuous black terminal band; iris variable,

grey to white; bill black to dark grey with white cere; legs red. Sexes similar, although female often duller on head and neck. Juvenile similar but duller all over, with head and breast drab grey. Race *albipennis* has a conspicuous white band slanting backwards from bend of wing.

Habitat. Arid to semi-arid fairly open woodland and scrub, including Chaco; sometimes in small *Eucalyptus* stands and near villages and unforested land, e.g. in cultivation. Race *albipennis* occurs as high as 2000-4200 m on Andean slopes from C Bolivia to NW Argentina (N Jujuy); nominate ranges up to altitudes of at least 1000 m in Catamarca and La Rioja, at base of Andes in NW Argentina.

Food and Feeding. Feeds mostly on seeds; one observer reported seeing birds eat fruit and greenery; in Argentina regarded as a pest of sunflower crops. Often seen in small flocks or pairs, but sometimes in large flocks; mostly feeds on ground.

Breeding. In Brazil recorded in Oct, but probably nests all year round, as in Argentina. Nests in trees. Lays 1-2 white eggs. No further information available.

Movements. Migratory in Brazil where associates with *C. picazuro*.

Status and Conservation. Not globally threatened. Widespread and common in lowland southern portions of range. Locally distributed on plateaus in Andean valleys of C & E Peru; also very local on W slope of Andes from Lima to Arequipa. In Bolivia, local in department of La Paz. In Argentina, is currently expanding its range and is considered a pest to farmers, especially attacking sunflower crops.

Bibliography. Babarskas *et al.* (1996), Barlow (1968), Belton (1984), Bucher & Nores (1988), Canevari *et al.* (1991), Contreras *et al.* (1990), Fjeldså & Krabbe (1990), Hayes (1995), Hellmayr & Conover (1942), Krabbe *et al.* (1996), Narosky & di Giacomo (1993), Nellar (1993), Nores *et al.* (1983), de la Peña (1988), Short (1975), Sick (1985, 1993), Stotz *et al.* (1996), Wetmore (1926).

36. Band-tailed Pigeon

Columba fasciata

French: Pigeon à queue barrée **German:** Bandtaube **Spanish:** Paloma Torcaza
Other common names: White-collared/Blue Pigeon

Taxonomy. *Columba fasciata* Say, 1823, Plum Creek, Colorado.

Forms a superspecies with *C. araucana* and *C. caribaea*. Proposed race *tucumana* of NW Argentina invalid. Race *albilinea* sometimes considered a separate species, incorporating *crissalis* and *roraimae*. Seven subspecies recognized.

Subspecies and Distribution.

C. f. fasciata Say, 1823 - SW British Columbia (including Vancouver I) S through W USA (Washington, California, New Mexico, W Texas) and most of Mexico to Guatemala, Honduras and NC Nicaragua.

C. f. vioscae Brewster, 1888 - mountains of extreme S tip of Baja California.

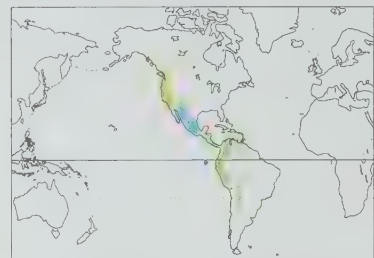
C. f. letonai Dickey & van Rossem, 1926 - border of Honduras and El Salvador, including Volcán de San Miguel.

C. f. parva Griseom, 1935 - N Nicaragua.

C. f. crissalis Salvadori, 1893 - Costa Rica and W Panama.

C. f. roraimae Chapman, 1929 - Venezuela, known only from Mt Roraima, on border with Guyana.

C. f. albilinea Bonaparte, 1854 - Colombia (Andes, Santa Marta Mts, Sierra de Perijá), N & S Venezuela, Trinidad and adjacent NW Brazil (Roraima), S through Andes of Ecuador, Peru and C Bolivia (La Paz, Cochabamba, W Santa Cruz) to NW Argentina (Jujuy, Salta, Catamarca and Tucumán).



Descriptive notes. Male 34-40 cm, 270-460 g; female 33-39.5 cm, 226-424 g. Head drab purple, paler and usually greyish on malar and throat region; white bar across nape or upper hindneck; metallic bronze below, feathers with sharp outlines producing a scaly effect; back and wings greyish brown with bronze gloss in certain lights; rump and uppertail-coverts grey; tail grey for proximal half, lighter and more brownish grey for distal half, with a band of dark grey or dull black across middle; primaries, primary coverts and alula dusky, primaries edged white; underparts drab purple; belly, vent and undertail-coverts white; iris pale yellow.

low to dark brownish with outer ring of pink or lilac, eyelids red; bill yellow with apical third black; legs yellow. Female duller with upperparts browner, head and underparts less vinaceous.

Juvenile lacks white nape bar and metallic neck feathers; head and sides of neck brownish grey, paler on chin and upper throat; scapulars sometimes suffused with brown; rectrices, remiges, primary coverts and alula dusky. Races *vioscae*, *letonai* and *parva* hardly differ from nominate; *crissalis* noticeably darker; *albilinea* and *roraimae* have entirely yellow bills, and even darker plumage, *roraimae* with rump glossed green.

Habitat. In North America inhabits coniferous forests and particularly mixed pine and oak (*Pinus*, *Quercus*) woodland; inland population occupies highland Ponderosa and oak forests at 1600-2400 m, but also occurs at higher elevations in lodgepole pine (*P. contorta*) and mixed spruce and fir (*Picea*, *Pseudotsuga*, *Abies*) forests; coastal populations found in mixed pine and oak mainly below 1000 m, but also in Douglas fir (*Pseudotsuga menziesii*), redwood (*Sequoia sempervirens*), hemlock-spruce (*Tsuga*) and alder (*Alnus*). Central American populations occur in highlands 1000-3000 m, in pine-oak and oak woodland. In South America, birds prefer humid heavily wooded hillsides and gullies, but also occur locally in semi-arid cloud forest, alder woods, secondary growth and savanna; mainly at 2000-3000 m, straggling to 3900 m. A canopy species.

Food and Feeding. Most detailed data from North America. Prefers acorns, when available; in W & C California, feeds on acorns of live oaks (*Q. agrifolia* and *Q. wislizenii*), in the foothills on golden oak (*Q. chrysolepis*) and along Sierra Nevada, San Bernardino and San Jacinto on acorns of black oak (*Q. kelloggii*); acorns last well through autumn, and in good seasons into Feb; when acorn crops are exhausted, birds turn to manzanita (*Arctostaphylos*) berries as well as Christmas berry (*Heteromeles arbutifolia*), coffee berry (*Rhamnus*), elder (*Sambucus glauca*) and chokecherry (*Prunus demissa*). Flowers and leaf buds consumed when fruit and nut crops become exhausted; also recorded feeding on leaf buds of manzanita, oaks and sycamore (*Acer*); takes grain in stubble fields or in newly sown areas. In addition to acorns, Costa Rican populations relish fruit of *Myrica* and *Rapanea*, and may descend low to consume berries of *Phytolacca*.

Breeding. Probably pairs in winter, when much courtship is observed; nests reported for every month in parts of range, but N of Mexico most breeding from early May to Aug; timing affected by food supply more than by photoperiod, as known to breed when daily light-dark cycles were only LD 10:14. Usually solitary when breeding, although communal nesting has been reported. Gonadal studies indicate at least 2 broods a year may be raised, given adequate food supply. Nest can be flimsy, sometimes with as few as 16-18 twigs; some nests consist of over 100 loosely arranged twigs. Usually 1 egg, occasionally 2 (c. 8% of nests in one study); incubation 19-20 days; fledging 20-28 days. Captive females have been known to lay a second clutch even before young have fledged, indicating that clutch-overlap may be a characteristic of this species. Adults have been known to produce crop milk up to 30 days after hatching of young, in contrast to seed-eating species which stop feeding milk to their young when 7-9 days old.

Movements. Populations N of California migratory, wintering in California and Baja California; also some vertical migrations to lower altitudes; Rocky Mts populations fly S to Mexican plateau. Autumn migration begins in Sept and continues into Oct; spring migration from late Mar and early Apr, increasing until May and ending in early Jun. Californian populations tend to be non-migratory, congregating in the foothills and valleys in winter. Costa Rican populations locally nomadic. Seasonal movements known in some South American populations although precise details are lacking. In Colorado, radio-tracking studies of adults to determine home-range size have revealed that individuals remain within 15 km of the capture site. Vagrant E to Montana, W North Dakota and Oklahoma.

Status and Conservation. Not globally threatened. Despite enormous range, species may be vulnerable and requires careful monitoring. Populations of coastal North America known to have declined over past 15-30 years; a downward trend of c. 6% of population per year has been documented; a study in 1992 revealed that populations in 1980's represented only 30-50% of those in 1960's, with causes of this decline uncertain, although alteration of nesting and roosting habitats may have contributed in part; herbicides may have reduced availability of berry-producing plants, notably from British Columbia to California; studies of effects of logging and regeneration on movements and nesting are needed. Fairly common to common in Mexico; more numerous in winter due to influx of migrants. In Costa Rica, populations reported to have been reduced by overhunting. Locally common in Colombia, though declining due to habitat loss. Still generally common in much of extensive South American range. In North America, suburban populations have occasionally been infected by trichomoniasis, due to infection by *Trichomonas gallinae*, this pathogen probably originating from contact with feral pigeons for which it can be fatal; however, real impact of trichomoniasis on present species unclear.

Bibliography. Adam & Kreba (1985), Alcocer (1981), Anderson, B. (1981), Armstrong (1983), Binford (1989), Block *et al.* (1992), Braun (1972, 1994), Canevari *et al.* (1991), Curtis (1981a, 1981b), Curtis & Braun (1983a, 1983b), Curtis *et al.* (1983), DeGraaf & Rappole (1995), Fitzhugh (1974), Fjeldså & Krabbe (1990), Fry & Vaughn (1977), Gutiérrez *et al.* (1975), Hellmayr & Conover (1942), Hilty & Brown (1986), Houston (1963), Howell & Webb (1995a), Irwin (1975), Jarvis & Passmore (1992), Kautz (1977), Kautz & Braun (1981), Keppie (1970, 1973, 1977), Land (1970), Lehmkuhl & Ruggiero (1991), MacGregor & Smith (1955), March & Sadtler (1970, 1972, 1975), Marshall (1988), Mathewson (1996), McCaughan & Jeffrey (1980), Meyer de Schauensee & Phelps (1978), Monroe (1968), Naether (1975a), Neff & Culbreath (1947), Passmore (1977), Passmore & Jarvis (1979),

Peeters (1962a, 1962b), de la Peña (1988), Peterjohn & Sauer (1994), Price *et al.* (1995), Pulliam (1996), Rappole *et al.* (1993), Ridgely & Gwynne (1989), Root (1988), Rowley (1966, 1984), Rutgers & Norris (1970), Sands & Zapata (1981), Schroeder & Braun (1993), Sick (1985, 1993), Silovsky, E.D. (1969), Silovsky, G.D. *et al.* (1968), Sisson (1968), Slosson & Goss (1982), Slud (1964), Small (1994), Stabler (1951), Stabler & Braun (1975), Stabler *et al.* (1977), Stiles & Skutch (1989), Stotz *et al.* (1996), Strong & Bock (1990), Tacha & Braun (1994), Tacha, Braun & Tomlinson (1994), Tveten (1993), Wetmore (1968), White (1973), White & Braun (1978, 1990), Wilbur (1987), Zammuto (1986), Ziegler (1971).

37. Chilean Pigeon

Columba araucana

French: Pigeon du Chili

German: Araukanertaube

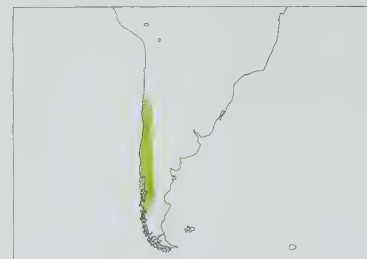
Spanish: Paloma Araucana

Other common names: Chilean Band-tail

Taxonomy. *Columba araucana* Lesson, 1827, Talcahuano, Concepción Bay, Chile.

Forms a superspecies with *C. fasciata* and *C. caribaea*. Monotypic.

Distribution. C & S Chile from Coquimbo S to C Fjorlands, including I Mocha; also SC & S Argentina, from Neuquén to W Chubut, and also SW Santa Cruz.



Descriptive notes. 35 cm. Mostly reddish purple throughout with narrow white half collar on neck and iridescent green nape patch below this collar; wing-coverts grey shading to bluish grey; primaries black with whitish fringes; lower back, rump and uppertail-coverts grey; tail bluish grey with broad black central band; iris orange, with ring of pink or yellow; orbital skin purple; bill black; legs red. Female duller and more brownish. Juvenile mostly vinous grey-brown with wing-coverts, rump and tail blue-grey.

Habitat. Inhabits forest and woodland in both lowlands and highlands up to 1000 m, notably

where *Araucaria araucana* and large *Nothofagus dombeyi* occur. Also found at forest edge and on cultivated land.

Food and Feeding. Relishes fruits of *Araucaria*. Arboreal and often gregarious feeder, sometimes gathering in large flocks.

Breeding. Eggs found Dec-Mar, also in May. Sometimes breeds in large loose colonies. Often nests in bamboo thickets. No further information available.

Movements. Mainly winters in C Chile, but some birds occurring S to Península de Taitao (C Aisén).

Status and Conservation. Not globally threatened. Currently considered near-threatened. Almost extirpated by Newcastle's Disease in 1954, but has recovered well and now fairly common again in parts of Chile. Recent records also for W Argentina at Lago Roca (SW Santa Cruz) and in Neuquén, Río Negro and Chubut.

Bibliography. Araya & Chester (1993), Behn (1957), Canevari *et al.* (1991), Casas & de la Peña (1987), Contreras *et al.* (1980), Fjeldså & Krabbe (1990), Goodall *et al.* (1946), Hellmayr (1932), Hellmayr & Conover (1942), Johnson (1967, 1972), Lane (1897), Olrog (1984), de la Peña (1988), Stotz *et al.* (1996), Vuilleumier (1985).

38. Ring-tailed Pigeon

Columba caribaea

French: Pigeon de la Jamaïque

German: Karibentaube

Spanish: Paloma Jamaicana

Other common names: Jamaican Band-tailed Pigeon, Ring-tail

Taxonomy. *Columba caribaea* Jacquin, 1784, Jamaica.

Forms a superspecies with the *C. fasciata* and *C. araucana*. Monotypic.

Distribution. Jamaica, especially in John Crow Mts, E part of Blue Mts and Cockpit Country. One specimen (in Paris) reportedly taken in Puerto Rico.



Descriptive notes. Male 38-48.5 cm, female 38-43 cm; one bird 250 g. Adult plumage reminiscent of juvenile *C. fasciata*; present species has proportionately longer tail; head, neck and underparts drab vinaceous, underparts tinged with pink; hindneck metallic green or bronze; rest of upperparts brownish grey; primaries dusky; basal portion of tail grey, terminal portion brownish grey, with dusky slate band across centre; undertail-coverts brownish white; iris brilliant orange; orbital skin red; bill and cere black; legs red. Female similar but back, scapulars and wing-coverts suffused with olive or brown; underparts more vinaceous, metallic hindneck less brilliant. Juvenile with grey of head and neck suffused with brown; foreneck to breast greyish brown passing to fawn or cinnamon on belly.

Habitat. Mostly in wet highland forests of Jamaica or wet limestone forest, "cockpit" country. Up to almost 2000 m, but as low as 150 m near Windsor.

Food and Feeding. In contrast to its two Jamaican congeners, *C. leucocephala* and *C. inornata*, which feed on both fruit and seed, present species eats solely fresh fruit and thus has a correspondingly weaker gizzard. Fruits eaten include those of *Sapium jamaicense*, *Cordia alliodora*, *Bumelia*, *Eugenia*, *Ficus laevis*, *Chrysophyllum oliviforme* and mistletoe berries; also takes fruits of introduced plants *Annona muricata*, *Cecropia peltata*, wild raspberries, shoots of *Dioscorea rotundata* and seeds of palmetto thatch; possible mutualistic relationship with the endemic tree *Noctandra antillana*. An arboreal feeder, it often takes fruit at the ends of branches and is therefore adept at climbing, and may even hang upside-down.

Breeding. Breeds in spring and summer. Nest is thick platform of twigs lined with leaves, bark and twigs, placed in top of tall tree, hidden amidst masses of climbing plants. No further information available.

Movements. Descends from highlands to lower elevations of 150-300 m in local autumn and winter.

Status and Conservation. CRITICALLY ENDANGERED. Extirpated from much of its former range on account of heavy hunting pressure, especially over last 150 years; banning of hunting

unfortunately appears to have made the bird a much coveted target. In addition, much habitat lost due to extensive clearing of forests; effects of this intensified by hurricanes, with resulting destruction of fruiting trees. Both hunting and forest destruction remain rampant, and pose very serious threats; effective protection urgently required.

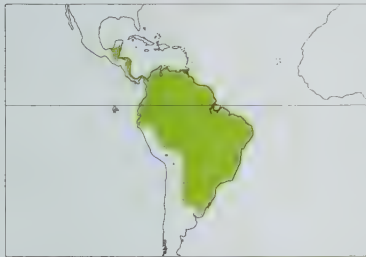
Bibliography. Anon. (1983), Biaggi (1983), Bond (1985), Collar & Andrew (1988), Collar, Crosby & Stattersfield (1994), Collar, Gonzaga *et al.* (1992), Davis *et al.* (1985), Downer & Sutton (1990), Gosse (1847), Haynes *et al.* (1989), Hellmayr & Conover (1942), Lack (1976), Momot (1985), Pérez-Rivera (1989a), Rutgers & Norris (1970), Scott (1982), Stotz *et al.* (1996), Varty (1991), Wunderle *et al.* (1992).

39. Pale-vented Pigeon
Columba cayennensis

French: Pigeon rousset **German:** Rotrückentaube **Spanish:** Paloma Colorada
Other common names: Rufous/Blue/Cayenne/Purple-tinted Pigeon

Taxonomy. *Columba cayennensis* Bonnatere, 1792, French Guiana. Has no obvious close relatives; one proposal is that it may be intermediate in some respects between the *C. fasciata* and *C. flavirostris* superspecies. Formerly listed as *C. rufina*. Five subspecies recognized.

Subspecies and Distribution.
C. c. pallidicrissa Chubb, 1910 - S Mexico (Chiapas and Veracruz) S to N Colombia.
C. c. andersoni Cory, 1915 - SE Colombia and E Ecuador E across Venezuela and Brazil N of Amazon to Pará.
C. c. tobagensis Cory, 1915 - Trinidad and Tobago.
C. c. cayennensis Bonnatere, 1792 - Guyana, Surinam and French Guiana.
C. c. sylvestris Vieillot, 1818 - E Peru and Brazil S of Amazon to Paraguay, N Argentina and Uruguay.



Descriptive notes. 25.5-26.5 cm; 167-262 g. Most of throat greyish white shading into grey on face and lower throat; hindcrown and nape iridescent green, bronze or pinkish; forehead, breast and neck dull pinkish purple merging into purplish chestnut on mantle and wing-coverts; flanks, belly and undertail-coverts grey; lower back, rump, uppertail-coverts and underwing dark bluish grey; secondaries and outermost greater coverts dark grey; primaries black with pale fringes; central tail feathers dark grey, paler towards tips, with indistinct central black band; iris varies from orange to red to purplish red; orbital skin red; bill and cere black; legs purplish red or magenta. Female duller; purplish areas of male replaced by drab brown. Juvenile male similar to adult female but with rufous edges to those feathers that are purplish in adult male; juvenile female similar to adult female but with pale edges to most feathers, notably on outermost greater wing-coverts. Race *pallidicrissa* paler, with belly and undertail-coverts whitish in male; *sylvestris* similar to nominate, but pattern of banding on tail more marked; other races resemble one or other of the aforementioned.

Habitat. Inhabits humid forest edge, and marshy savanna with scattered forest patches; tends to avoid closed forest. On Tobago, occurs in hill forest and secondary scrub; but on Trinidad, inhabits mangroves, woods bordering savanna and low-lying forest. In Venezuela, lives in a variety of habitats including mangroves, but avoids rain forest. Found from sea-level up to 700 m on Atlantic slopes of Central America; ranges up to 600 m on humid Caribbean and S Pacific coast of Costa Rica; up to 800 m to N of R Orinoco, but up to 1300 m to S of it; in Colombia may occasionally wander up to 2100 m.

Food and Feeding. Small fruits, berries and seeds of *Brysonima*, *Solanum* and *Miconia* form part of diet; in Costa Rica known to feed on berries of *Trema* and various melastomes, such as *Conostegia*. Encountered singly or in flocks of up to 500 individuals.

Breeding. Season Feb-Jun in Costa Rica; Feb-May on Trinidad; recorded in Mar, May, Jun and Nov on Tobago. Nest of twigs is placed 1-15 m above ground level, in a shrub or small tree. Lays 1 egg.

Movements. No evidence of migration. Flocks of 12 or more birds have been encountered after the breeding season in Costa Rica and Brazil.

Status and Conservation. Not globally threatened. Fairly common to common in S Mexico, Guatemala, Belize and Honduras, and also in Colombia; commonest large pigeon throughout hot lowlands of Brazil. No threats known; wide variety in terms of habitat preference suggests some degree of adaptability; species seems reasonably secure at present.

Bibliography. Belton (1984), Caneyari *et al.* (1991), Chebez (1992), Clinton-Eitnienar (1981c), Contreras *et al.* (1990), French (1980), Friedmann (1948b), Goodwin (1973b), Guix (1995), Haverschmidt & Mees (1994), Hellmayr & Conover (1942), Herklots (1961), Hilty & Brown (1986), Howell & Webb (1995a), Land (1970), Meyer de Schauensee & Phelps (1978), Monroe (1968), de la Peña (1988), Ridgely & Gwynne (1989), do Rosário (1996), Short (1975), Sick (1985, 1993), Skutch (1964), Slud (1964), Snyder (1966), Stiles & Skutch (1989), Stotz *et al.* (1996), Tostain *et al.* (1992), Weimore (1957, 1968).

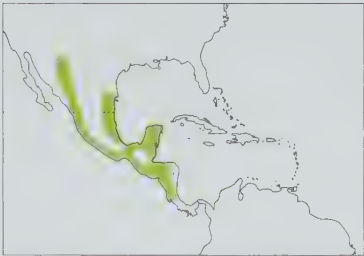
40. Red-billed Pigeon
Columba flavirostris

French: Pigeon à bec rouge **German:** Rotschnabeltaube **Spanish:** Paloma Piquirroja
Other common names: Blue Pigeon

Taxonomy. *Columba flavirostris* Wagler, 1831, Veracruz, Mexico. Forms a superspecies with *C. oenops* and *C. inornata*. Four subspecies recognized.

Subspecies and Distribution.
C. f. restricta van Rossem, 1930 - W Mexico, from WC Sonora to Sinaloa.
C. f. madrensis Nelson, 1898 - Tres Marias Is (off WC Mexico).
C. f. flavirostris Wagler, 1831 - lower Rio Grande Valley in Texas through SE Sonora, Sierra Madre in Chihuahua, and San Luis Potosí S to Nicaragua and E Costa Rica.
C. f. minima Carriker, 1910 - lowlands of Costa Rica about Gulf of Nicoya.

Descriptive notes. Male 32-35 cm, female 30-37 cm; 268-424 g. Head, neck and breast dull purplish, darker on hindneck; chin and upper throat greyish white; back and wings olive brown, greater coverts bluish grey, lesser coverts reddish brown forming a conspicuous patch; rump and uppertail-coverts slate grey; tail black; primaries and secondaries dark grey, narrowly edged with white; belly, flanks



and underwing-coverts bluish grey; iris orange-yellow to reddish orange, eyelids red or carmine to rosy red; bill pale horn on distal half, basal half including cere pink; legs red. Females sometimes indistinguishable in colour from males, but usually duller with greyer crown and smaller reddish brown wing patch. Juvenile duller; head, neck and underparts drab vinaceous; reddish brown wing patch more rusty and mostly on terminal portion of feathers. Races differ in size and amounts of white-edging to wing feathers; *madrensis*, the most distinctive, is slightly larger than nominate, with broader white edges to greater wing-coverts.

Habitat. At N extreme of range, inhabits heavily wooded bottomlands of Rio Grande in Texas; in vicinity of Resaca de la Palma (near Brownsville), Texas, found in forest of ebony, huisache, mesquite and huckleberry, with thick undergrowth of thorny shrubs and vine tangles. In Mexico and Central America, principally a lowland species, inhabiting forest and edge habitat; prefers semi-open areas with forest patches and is rarely found in humid evergreen forests; given to invading clearings. In Costa Rica, may range up to 2140 m in semi-arid Guanacaste and central plateau; in the less arid N, up to 1070 m; especially numerous in clearings at mid-elevations.

Food and Feeding. Feeds on berries, acorns and buds; in Tres Marias Is, has been recorded taking wild figs (*Ficus*) and guava (*Psidium*). Sometimes forages on the ground in open areas. In places it is considered a pest on corn and sorghum.

Breeding. Season Mar-Aug in Costa Rica. Of 4 nests found in Oaxaca, Mexico, 1-5-2-5 m above ground, one was placed in an evergreen sapling in the forest understorey, the other three in bullhorn acacia. In Costa Rica, nests have been found between 4-5-25 m up on horizontal branches of trees; nest is frail stick platform. One egg is laid. No further information available.

Movements. Resident from Mexico to Honduras. Known to be migratory in places, but precise details lacking; flocks consisting of 15-20 individuals arrive in Texas in Feb; absent from the Cordillera Central of Costa Rica Jul-Mar. Flocks of up to 50 have been encountered.

Status and Conservation. Not globally threatened. Clearing of land in 1920's precipitated a decline of this species in Texas, where it is now a rare and protected bird. Common to fairly common throughout most of its Mexican range, though less common in N Honduras; still hunted in Mexico, and some 1000-3000 birds are declared annually by hunters from USA crossing the border. Species believed to be declining throughout its range and merits close monitoring.

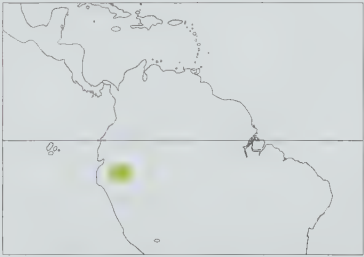
Bibliography. Anon. (1983), Bent (1932), Binford (1989), DeGraaf & Rappole (1995), Hellmayr & Conover (1942), Howell & Webb (1995a), Land (1970), Lowery & Dalquest (1951), Monroe (1968), Oberholser (1974), Rappole *et al.* (1993), Ridgway (1916), Rowley (1984), Skutch (1964), Slud (1964), Stiles & Skutch (1989), Stotz *et al.* (1996), Terres (1982), Wheelwright *et al.* (1984).

41. Peruvian Pigeon
Columba oenops

French: Pigeon du Pérou **German:** Perutaube **Spanish:** Paloma Peruana
Other common names: Salvin's Pigeon

Taxonomy. *Columba oenops* Salvin, 1895, Peru. Forms a superspecies with *C. flavirostris* and *C. inornata*. Monotypic.

Distribution. Andes of extreme SE Ecuador, and also of N Peru from valley of upper R Marañón S to La Libertad.



Descriptive notes. Male 34 cm, female 31-34 cm; c. 276 g. Similar in colour and pattern to *C. flavirostris* but cere and base of bill red, tip bluish grey; iris black with surrounding orange and blue rings; eye-ring blue-grey with narrow red margin; entire mantle, inner wing-coverts and scapulars chestnut tinged with purplish rather than olive brown.

Habitat. Inhabits riparian forest dominated by large willows (*Salix humbertiana*) and pepper trees (*Schinus molle*). In some seasons prefers dry forests dominated by *Ceiba*, cacti and various leguminous plants including *Acacia*. Occurs at altitudes ranging from 850 m at Balsas

up to 2400 m at Malca.

Food and Feeding. Observed eating ripe coca seeds; otherwise no data. Seen in small groups of 3-6 at Balsas.

Breeding. No data on breeding; a juvenile was collected in Apr.

Movements. Moves seasonally and altitudinally to dry forests on the steep slopes of the Marañón Valley.

Status and Conservation. **VULNERABLE.** Generally uncommon to scarce throughout very restricted range; only recently discovered in Ecuador. One survey reported species as being fairly common in a small inaccessible portion of Marañón Valley around Balsas and in the valley bottoms E of Huamachuco. Very localized distribution probably renders species seriously vulnerable to the continuing degradation and loss of its habitat; probably sustains some hunting pressure. Survey urgently needed in order to establish precise limits of range, population levels and current trends, and conservation requirements.

Bibliography. Anon. (1995), (1996f), Bangs & Noble (1918), Collar, Crosby & Stattersfield (1994), Collar, Gonzaga *et al.* (1992), Davies *et al.* (1994, 1997), Dorst (1957c), Dunning (1982), Hellmayr & Conover (1942), Meyer de Schauensee (1982), Parker *et al.* (1982), Rösler (1996), Stotz *et al.* (1996), Wege & Long (1995).

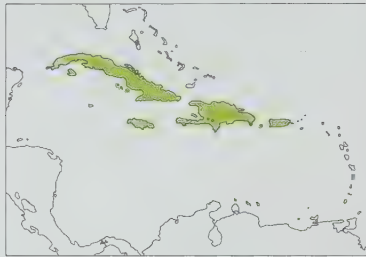
42. Plain Pigeon
Columba inornata

French: Pigeon simple **German:** Rosenschultertaube **Spanish:** Paloma Boba
Other common names: Blue Pigeon

Taxonomy. *Columba inornata* Vigors, 1827, near Havana, Cuba. Forms a superspecies with *C. flavirostris* and *C. oenops*. Validity of subspecies disputed; further studies required. Three subspecies tentatively recognized.

Subspecies and Distribution.

C. i. inornata Vigors, 1827 - Cuba and I of Pines, and Hispaniola.
C. i. exigua (Ridgway, 1915) - Jamaica.
C. i. wetmorei J. L. Peters, 1937 - Puerto Rico.



Descriptive notes. Male 41 cm, female 39 cm; 250 g. Head, neck and most of underparts vinaceous, slightly darker on crown, greyer on forehead; back, scapulars, outer lesser wing-coverts greyish brown, white-margined; rump, uppertail-coverts, flanks and undertail-coverts bluish grey; tail dark grey; iris with ring of pale blue surrounded by an outer ring of dark blue, followed by a ring of pale orange; orbital skin grey; bill and cere black; legs red. Female paler and duller. Juvenile greyish brown all over, paler on belly; wing-coverts and breast feathers with narrow pale margins. Race *wetmorei* deeper in colour, with white

edging on wings broader on average; *exigua* deeper still in colour, with white eye surrounded by red orbital skin.

Habitat. Found in variety of habitats, but preferences differ between islands. In Cuba, mostly in lowland forest, mangroves and swampy areas, but also known from Trinidad Mts and Sierra de Najasa. In Hispaniola, inhabits highland pine and broadleaf forests, but also occurs in dry coastal desert and in mangroves. In Jamaica, occupies montane rain forests, but makes daily forays to lowlands to feed. Formerly a bird of lowland forests in Puerto Rico, but now only found in areas of second growth with native and introduced plants and patches of farmland and cattle pastures.

Food and Feeding. Diet includes fruits, berries, seeds, buds, leaves and flowers; has been observed feeding on berries of ateye tree (*Cordia alliodora*) and fruit of royal palm *Roystonea regia* in Cuba; in Puerto Rico, feeds mostly on fruits of royal palm *R. borinquena* and also *Cestrum diurnum* and *Didymopanax morototoni*. Mostly an arboreal feeder, but sometimes feeds on the ground.

Breeding. Recorded in Apr, May and Jul in Cuba; season Apr-Jul in Hispaniola; appears to breed all year round in Puerto Rico, with peak Dec-Jun. Nest placed in tree (e.g. mangrove, pine or hardwood) or on epiphytic plants, 6-21 m above ground; in a detailed study in Puerto Rico, 30 nests were placed in mature bamboo stands, 10 in *Eugenia jambos* trees and a few others in other trees of various species. Clutch of 1 egg in Puerto Rico, 2 elsewhere; incubation 13-15 days; fledging 21-23 days.

Movements. Makes daily flights from highlands to lowland feeding areas in Jamaica. Forms flocks after the breeding season.

Status and Conservation. ENDANGERED. Still to be found in some numbers in Haiti, where firearms are prohibitively expensive. Elsewhere, highly endangered in Cuba, which holds largest known population of c. 100 pairs; severely threatened in Puerto Rico, where under 300 birds thought to survive; situation in Jamaica may be even worse than that in Puerto Rico. In Dominican Republic, has declined notably and a survey in 1986 recorded no birds, and found that several sites occupied 10 years previously had been abandoned. Main causes of decline are overhunting and habitat degradation, the latter compounded by hurricanes; however, still regular though uncommon in Sierra de Bahoruco National Park in mid-1990's. Captive breeding programme under way in Puerto Rico; a DNA study on the Puerto Rican birds indicates a low level of genetic variation.

Bibliography. Anon. (1982, 1983), Banks (1986), Barbour (1943), Biaggi (1983), Bond (1985), Collar, Crosby & Stattersfield (1994), Collar, Gonzaga *et al.* (1992), Conser & Pérez-Rivera (1988), Danforth (1936), Dod (1981, 1987), Ehrlich *et al.* (1992), Faaborg (1985), Godinez & Oviedo (1995), Greenway, J.C. (1967), Hellmayr & Conover (1942), King (1978/79), Lowe *et al.* (1990), Miyamoto *et al.* (1994), Pérez-Rivera (1978, 1980, 1985, 1988, 1989b, 1990), Pérez-Rivera & Collazo (1976a, 1976b), Pérez-Rivera *et al.* (1988), Raffaele (1989), Rivera-Milán (1992, 1996), Ruiz-Lebrón *et al.* (1995), Stotz *et al.* (1996), Vaurie (1957), Wauer (1996), Wetmore & Swales (1931), Wiley (1985c).

43. Plumbeous Pigeon

Columba plumbea

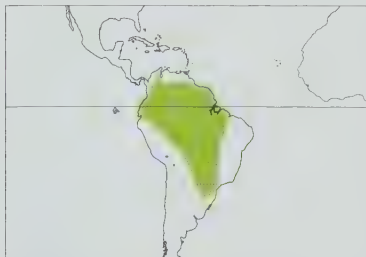
French: Pigeon plombé **German:** Weintaube **Spanish:** Paloma Plomiza

Taxonomy. *Columba plumbea* Vieillot, 1818, Brazil.

Forms a species group with *C. subvinacea*, *C. nigriristris* and *C. goodsoni*; all four small species have very similar songs distinct from other New World *Columba*; sometimes placed in a subgenus *Oenoenas*. Some taxonomic confusion with *C. subvinacea* in past. Five subspecies currently recognized.

Subspecies and Distribution.

C. p. delicata Berlepsch & Stolzmann, 1902 - E Colombia through W & S Venezuela and the Guianas to N Brazil, and S through E Ecuador and E Peru to N & E Bolivia.
C. p. chapmani (Ridgway, 1916) - NW Ecuador.
C. p. pallescens Sneath, 1908 - S tributaries of Amazon from R Purús to Pará.
C. p. baeri Hellmayr, 1908 - Goiás and NW Minas Gerais, C Brazil.
C. p. plumbea Vieillot, 1818 - NE & E Paraguay and SE Brazil.



Descriptive notes. 34 mm; 172-231 g. Head, neck and underparts dark grey sometimes suffused with pinkish or purplish tinge; throat paler often dull cream; mantle, back, rump, wings and tail dark greyish brown to drab olive; hindneck sometimes with bronzed spots; iris red; orbital skin purplish red; bill black, cere red; legs red. Female similar but purplish tinges less intense, neck spots more conspicuous. Juvenile duller with purple tinge much reduced; rusty edges to wing-coverts and breast feathers, and sometimes some other feathers. Races differ in general plumage tones, and presence and extent of purple or dark

brownish purple tinges on upperparts.

Habitat. Tropical and subtropical rain forest and cloud forest; also secondary growth. N of R Orinoco occurs within altitude range of 1200-1900 m, but S of the river at 200-300 m. In Brazil, frequents tree tops in tall forests of cold areas, such as Serra do Mar and Serra da Mantiqueira, as well as hot regions like Rio São Francisco and Minas Gerais.

Food and Feeding. Takes fruit and seeds from the forest canopy; mistletoe is eaten in great quantities at certain times of the year in Brazil.

Breeding. No information available.

Movements. Makes seasonal altitudinal migrations at Itatiaia, SE Brazil.

Status and Conservation. Not globally threatened. Widespread and apparently fairly common throughout much of extensive range, though precise details lacking; definitive identification by sight rather difficult, due to possible confusion with rather similar and extensively sympatric *C. subvinacea*, but calls quite distinct; typically tends to be inconspicuous in upper storey of forest. Fairly common to common in suitable habitat in Colombia. Popular belief in Brazil that flesh of present species tastes bitter, if bird feeds extensively on mistletoe.

Bibliography. Belton (1984), Brooks *et al.* (1993), Canevari *et al.* (1991), Goodwin (1973b), Guix (1995), Haverschmidt & Mees (1994), Hayes (1995), Hellmayr & Conover (1942), Hilty & Brown (1986), Meyer de Schauensee (1964), Meyer de Schauensee & Phelps (1978), do Rosário (1996), Schubart *et al.* (1965), Sick (1985, 1993), Snyder (1966), Stotz *et al.* (1996), Tostain *et al.* (1992), Zimmer (1930).

44. Ruddy Pigeon

Columba subvinacea

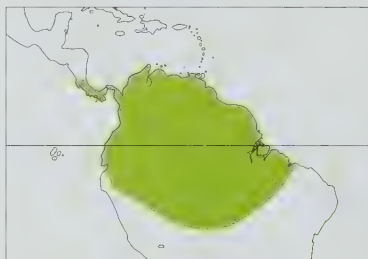
French: Pigeon vineux **German:** Purpurtaube **Spanish:** Paloma Vinosá
Other common names: Dusky Pigeon(f)

Taxonomy. *Chloroenas subvinacea* Lawrence, 1868, Dota, Costa Rica.

Forms a species group with *C. plumbea*, *C. nigriristris* and *C. goodsoni*; all four small species have very similar songs distinct from other New World *Columba*; sometimes placed in a subgenus *Oenoenas*. Some taxonomic confusion with *C. plumbea* in past. Races *berlepschi* and *purpureotincta* have both been considered distinct species. Three further races (*ruberrima*, *anolaimae*, *ogilviegranti*) sometimes recognized for local populations in Colombia. Six subspecies recognized.

Subspecies and Distribution.

C. s. subvinacea (Lawrence, 1868) - subtropical zone of Costa Rica and Panama.
C. s. berlepschi Hartert, 1898 - Pacific coast from SE Panama to SW Ecuador.
C. s. zuliae Cory, 1915 - NE Colombia and W Venezuela.
C. s. peninsularis Chapman, 1915 - Paria Peninsula, NE Venezuela.
C. s. purpureotincta Ridgway, 1888 - SE Colombia through S Venezuela to the Guianas.
C. s. bogotensis (Berlepsch & Leverkühn, 1890) - N end of W Andes of Colombia S to Amazonian Brazil and N & E Bolivia.



Descriptive notes. Male 27-32.5 cm, 180 g; female 30-32 cm, 164 g. Very similar in appearance to *C. plumbea*, but smaller; general colour more reddish to purplish; underside and inner webs of primaries with a cinnamon or chestnut tinge; bill black, proportionately smaller and shorter than in *C. plumbea*, cere grey; iris varies from pink to purplish red to brownish, with pale inner ring; orbital skin dull red; legs red to purplish red. Female similar but slightly duller with upper throat paler and underparts less purplish. Juvenile duller than female, upperparts browner; hindneck and sides of neck greyish to drab brownish; wing-

coverts, scapulars, crown, rump and uppertail-coverts have feathers edged with various shades of cinnamon. Races differ mainly in various shades of reddish purple or rufous on upperparts.

Habitat. In Costa Rica, frequents canopy in medium to high altitude forests; also forest edge and secondary growth; breeds mainly from 1500 m up to tree-line. In Panama, occurs in highlands above 1070 m. Prefers cloud forest in Venezuela, ranging up to 1100 m S of Orinoco, and up to 2200 m N of the river. In Colombia, usually found below 1500 m, but sometimes up to 2800 m. In Brazil, occupies tall forest in the Mato Grosso and Maranhão.

Food and Feeding. Eats fruits off trees, e.g. *Cecropia*; also feeds on fruits of epiphytes and mistletoe. Generally seen as singles, pairs or groups of up to 15.

Breeding. Recorded Apr-Jun and Aug in Colombia. Builds a platform nest of coarse sticks 5 m above the ground. Clutch 1 white egg. No further information available.

Movements. In Costa Rica, descends from highlands above 1500 m down to 900 m in non-breeding season, notably on Caribbean slope.

Status and Conservation. Not globally threatened. Widespread and apparently not uncommon in general, but status poorly documented; definitive identification by sight rather difficult, due to possible confusion with rather similar and extensively sympatric *C. plumbea*, but calls quite distinct; typically tends to be inconspicuous in upper storey of forest. Fairly common in suitable habitat in Colombia.

Bibliography. Chapman (1926), Friedmann (1948b), Haverschmidt & Mees (1994), Hellmayr & Conover (1942), Hilty & Brown (1986), Meyer de Schauensee & Phelps (1978), Parker *et al.* (1995), Ridgely & Gwynne (1989), Sick (1985, 1993), Skutch (1951), Slud (1964), Snyder (1966), Stiles & Skutch (1989), Stotz *et al.* (1996), Tostain *et al.* (1992), Wetmore (1968), Wheelwright *et al.* (1984).

45. Short-billed Pigeon

Columba nigriristris

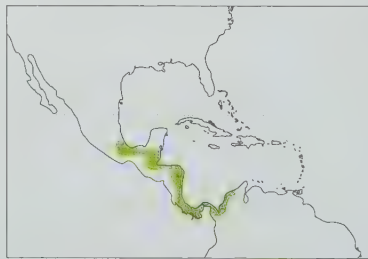
French: Pigeon à bec noir **German:** Kurzschnabeltaube **Spanish:** Paloma Piquicorta

Taxonomy. *Columba nigriristris* P.L. Sclater, 1860, Oaxaca, Mexico.

Forms a species group with *C. plumbea*, *C. subvinacea* and *C. goodsoni*; all four small species have very similar songs distinct from other New World *Columba*; sometimes placed in a subgenus *Oenoenas*. Monotypic.

Distribution. SE Mexico to E Panama and NW Colombia (N Chocó).

Descriptive notes. Male 27-31 cm, female 26-29 cm; 128-236 g. Similar in appearance to *C. subvinacea* with a larger and stouter bill; mantle, back, rump and wing-coverts olive brown or dark purplish brown, darker than reddish nominate race of *C. subvinacea* which occurs sympatrically in some areas in Costa Rica and Panama; iris pink, vinous or rose, eyelids red; bill and cere black, rectus dull reddish; legs



red. Female sometimes indistinguishable, but tends to be duller; feathers of hindneck sometimes with blackish centres and purplish or bronzy sides; apparently vestigial display plumage more noticeable than in male. Juvenile duller all over, feathers of upperparts with rusty fringes; feathers of head, neck and breast with broad rust red fringes.

Habitat. Occupies forest canopy, forest edge and tall secondary growth in humid lowlands, ranging in places up to 1500 m; absent in "dry" Pacific NW of Costa Rica.

Food and Feeding. Relishes mistletoe and other fruits and berries. In Costa Rica, will descend almost to ground level to feed on pokeberry (*Phytolacca rivinoides*) which can be abundant in clearings. Mostly an arboreal feeder occupying middle to upper storeys of trees; similarly descends to ground to take gravel and small invertebrates.

Breeding. Mar and Aug in Costa Rica; Jun in NW Panama; Jan in N Colombia. Builds a nest platform of twigs and dry inflorescences, situated 5-30 m up in a tree or in a dense vine tangle in tall secondary growth forest. Clutch is 1 white egg. No further information available.

Movements. Resident.

Status and Conservation. Not globally threatened. Common to abundant in its preferred habitat; a characteristic species of lowland forests in Central America. Common to fairly common in Mexico, Guatemala and Honduras; marginal in Colombia. Tendency to occupy dense canopy means that species is often underrecorded. No significant threats known.

Bibliography. Binford (1989), Blake (1992), Dearborn (1907), Hellmayr & Conover (1942), Hilty & Brown (1986), Howell & Webb (1995a), Land (1970), Lowery & Dalquest (1951), Monroe (1968), Paynter (1957), Ridgely & Gwynne (1989), Skutch (1951, 1964), Slud (1964), Stiles & Skutch (1989), Stotz *et al.* (1996), Wetmore (1968), Wheelwright *et al.* (1984).

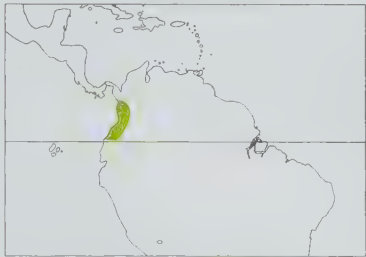
46. Dusky Pigeon
Columba goodsoni

French: Pigeon de Goodson German: Goodsontaube Spanish: Paloma Oscura

Other common names: Goodson's Pigeon

Taxonomy. *Columba goodsoni* Hartert, 1902, Pambilar, Ecuador. Forms a species group with *C. plumbea*, *C. subvinacea* and *C. nigrirostris*; all four small species have very similar songs distinct from other New World *Columba*; sometimes placed in a subgenus *Oenoenas*. Monotypic.

Distribution. Lowlands of W Colombia (from middle Atrato and Serranía de Baudó) to NW Ecuador (S to Pichincha).



Descriptive notes. 24 cm. Very similar to *C. nigrirostris* but crown, sides of head, throat and breast mostly grey or purplish grey; rufous of underwing brighter and more extensive; nape grey with purple gloss; wings and tail bronzy grey sometimes with purple gloss. Sexes alike. No information on juvenile plumage.

Habitat. Rain forest, mainly in lowlands but also in hills up to 1500 m.

Food and Feeding. No information available.

Breeding. Birds taken in breeding condition Jan-May and Aug in Colombia. No further information available.

Movements. No information available.

Status and Conservation. Not globally threatened. Few data available, as range comprises essentially zones that are poorly known ornithologically. Species has very restricted range, within which is common very locally. Populations should be surveyed and then monitored, as deforestation may prove to be a serious threat. Biology virtually unknown; research required.

Bibliography. Butler (1979), Dunning (1982), Haffer (1967, 1975), Hellmayr & Conover (1942), Hilty & Brown (1986), Meyer de Schauensee (1964, 1982), Ridgely & Gwynne (1989), Stotz *et al.* (1996).



47. Eastern Bronze-naped Pigeon

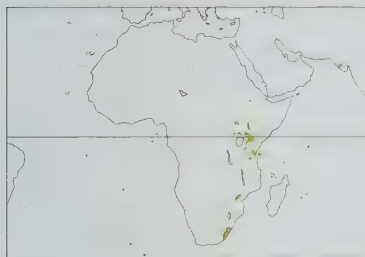
Columba delegorguei

French: Pigeon de Delegorgue **German:** Bronzehalstaube **Spanish:** Paloma de Delegorgue
Other common names: Bronze-naped/Delegorgue's/Crimson-winged Pigeon

Taxonomy. *Columba Delegorguei* Delegorgue, 1847, Durban, Natal.
Forms a superspecies with *C. iriditorques* and *C. malherbii*, and all three may be conspecific; these three sometimes placed in a subgenus *Turturoena*. Two subspecies recognized.

Subspecies and Distribution.

C. d. sharpei (Salvadori, 1893) - SE Sudan through Uganda and Kenya to Tanzania (including Zanzibar).
C. d. delegorguei Delegorgue, 1847 - Malawi, E Zimbabwe and Mozambique (Mt Gorongosa) to South Africa (Transkei and E Griqualand to Natal and W Zululand).



Descriptive notes. 33 cm; male 136-175 g, female 133-154 g. Forehead and face dark slaty grey, crown slightly iridescent; nape and neck iridescent pink, green, mauve or amethyst depending on light; white band spans hindneck, fringed with violet-pink posteriorly; mantle, scapulars and wing-coverts dark reddish purple to purplish brown; lower mantle with some green iridescence; rest of upperparts slaty. Outertail feathers with 4 mm wide grey tips; breast dark mauve-pink, feathers often with fine grey vermiculations; lower breast brownish, vermiculations more prominent than on upper breast; belly reddish brown; flanks and undertail-coverts dark grey; iris dark brown, whitish, grey or yellow; orbital skin pink or greyish pink; bill grey, pale horn distally; legs pink or red. Female lacks white collar; crown and nape coppery brown, mantle and wing-coverts blackish; underparts lack male's purple tinge, grey with fine buffy vermiculations. Juvenile male similar to adult but crown and nape grey, neck iridescence reduced, upperparts dark greyish brown and wing-coverts and feathers of underparts fringed with rufous. Race *sharpei* has green iridescence on nape and upper back; flanks grey, vent buff.

Habitat. A canopy species occupying lowland evergreen and adjacent riparian woodland, locally at higher altitudes; in Natal, restricted to climax forest of mist belt. In Zimbabwe, occurs below 500 m, but in Dongotona and Didinga Mts of Sudan occurs at 1100-2800 m; on Mt Thyolo in Malawi, ranges up to 1475 m.

Food and Feeding. Primarily a fruit-eater but also takes berries of *Trema orientalis*, some seeds, insect larvae and nymphs of cicadas; fruits taken include those of wild figs, *Podocarpus latifolius*, *Macaranga capensis* and *Phalodiscus zambesianus*.

Breeding. Mar-Jun and Dec in Uganda; Nov in Malawi; Jan in Zimbabwe; Nov-Apr in South Africa. Nests is a platform of twigs placed 7-10 m above ground in a tree. Clutch 2 white eggs; both sexes incubate and feed young.

Movements. In one study in Kenya, species present on every census day in Mar and Apr but absent after May, suggesting local seasonal movements, though precise details lacking.

Status and Conservation. Not globally threatened. Locally common in E Africa; common in mountains of Sudan. Rare and possibly threatened in South Africa, where it is affected by habitat destruction.

Bibliography. Benson & Benson (1977), Benson & Irwin (1966), Brickell (1984a), Britton (1980a), Brooke (1984a), Clancey (1985), Dowsett & Dowsett-Lemaire (1993), Dowsett & Forbes-Watson (1993), Ginn *et al.* (1989), Lewis & Pomeroy (1989), Mackworth-Praed & Grant (1957, 1962), Maclean (1993), Nikolaus (1987), Rösler (1996), Rowan (1983), Rutgers & Norris (1970), Sclater & Moreau (1932), Short *et al.* (1990), Snow (1978), Urban *et al.* (1986), Zimmerman (1972), Zimmerman *et al.* (1996).

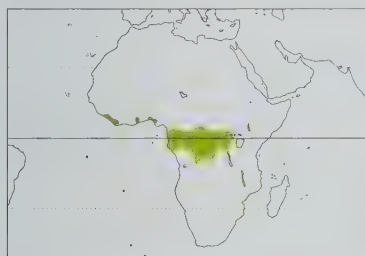
48. Western Bronze-naped Pigeon

Columba iriditorques

French: Pigeon à nuque bronzée **German:** Glanzkopftaube **Spanish:** Paloma Nuquibronceada
Other common names: Bronze-naped Pigeon

Taxonomy. *Columba* [sic] *iriditorques* Cassin, 1856, St Paul's River, Liberia.
Forms a superspecies with *C. delegorguei* and *C. malherbii*, and all three may be conspecific; these three sometimes placed in a subgenus *Turturoena*. Monotypic.

Distribution. Sierra Leone, W Ivory Coast and S Ghana through SW Nigeria to NW Angola, occupying whole of Congo Basin from S Cameroon and W Congo E to SW Uganda and S to C Zaire.



Descriptive notes. 25 cm; male 130 g, female 122 g. Head bluish grey, throat paler, iridescent pink or green on crown and nape; hindneck and upper mantle iridescent copper-bronze, green or pink; upperparts slaty with iridescent golden green, green or violet-blue fringes on mantle and scapulars; central rectrices slate with obscure dark grey tips; outer rectrices with dark chestnut inner webs and slaty outer webs with broad buff terminal bands; underside of tail chestnut with buff tips; breast and underparts dark mauve-pink, wings and uppertail-coverts black and greyish, slightly iridescent; iris pink, pink-red, grey, greenish yellow or blue; orbital skin reddish; bill grey, white-tipped, cere red or purplish black; legs pink or light red. Female has face suffused with brown, crown and nape bronzy brown, hindneck iridescent pink or green; breast and underparts rufous with fine grey or grey and rufous vermiculations; vent and undertail-coverts bright chestnut; iris sometimes greenish yellow.

Habitat. Occupies lowland forests from sea-level up to 1500 m; also riparian evergreen forests, old secondary growth, forested slopes, gallery forest and dense thickets away from water; in Sierra

Leone, even comes into gardens. Usually in canopy but can occur in low vegetation and on the forest floor. Usually solitary but also seen in pairs and groups of 3-4 birds.

Food and Feeding. Mainly fruit but also seeds; fruits identified as having been consumed include *Musanga*, *Eisterya* and *Horonga*.

Breeding. Mar, Apr, Jul and Sept in Liberia; Dec-Mar in Zaire; Oct in Zambia. A nest discovered in Zambia was a flimsy platform in a dense thicket placed 1-2 m above ground. It contained 1 pale cream egg.

Movements. Resident.

Status and Conservation. Not globally threatened. Reported as uncommon in Cameroon and the Congo Basin; however, species may perhaps be easily overlooked, as it usually keeps well hidden in the canopy; not uncommon in Liberia, Nigeria and Rwanda; in Sierra Leone, common in lowland forests but less so in other habitats. CITES III in Ghana.

Bibliography. Bannerman (1953), Benson (1959), Colston & Curry-Lindahl (1986), Demey & Fishpool (1994), Dowsett & Dowsett-Lemaire (1993), Dowsett & Forbes-Watson (1993), Elgood *et al.* (1994), Fry *et al.* (1985), Gatter (1988), Grimes (1987), Lippens & Wille (1976), Louette (1981), Mackworth-Praed & Grant (1962, 1970), Pinto (1983), Salvadori (1893), Schuchmann (1985), Short *et al.* (1990), Snow (1978), Thiollay (1985), Urban *et al.* (1986).

49. Sao Tome Bronze-naped Pigeon

Columba malherbii

French: Pigeon de Malherbe **German:** Malherbetaube **Spanish:** Paloma de Malherbe
Other common names: Sao Tome Grey-pigeon, Malherbe's Pigeon

Taxonomy. *Columba Malherbii* J. and E. Verreaux, 1851, Gabon; error = São Tomé.

Forms a superspecies with *C. delegorguei* and *C. iriditorques*, and all three may be conspecific; these three sometimes placed in a subgenus *Turturoena*. Monotypic.

Distribution. Príncipe, São Tomé and Pagalu (Annobón) in Gulf of Guinea.



Descriptive notes. 28 cm. Like *C. iriditorques*, but hindneck and upper mantle iridescent green or pink on a slaty background rather than copper-bronze; scapulars, wing-coverts and mantle to uppertail-coverts blackish with greenish sheen; throat, breast and belly grey; vent and undertail-coverts rufous with grey speckling; tail dark grey above, outer rectrices with ochraceous wash notably on inner webs; tail pale ochraceous grey below; iris pale grey; bill grey, pale tipped; legs red. Female similar but underparts darker grey, lower breast and upper belly feathers with fine ochraceous speckling; lower belly, undertail-coverts and vent pale rufous with grey speckling. Juvenile has iridescence of hindneck collar less extensive; forehead pale grey and forecrown pale rufous; upperparts replete with ochraceous or rufous freckles.

Habitat. An inhabitant of deep forest at 400-500 m on Pagalu; on São Tomé and Príncipe, occurs in forests and plantations.

Food and Feeding. Feeding takes place 3-16 m above ground in the middle stratum of the trees. Observed as single individuals or in groups of up to 7 birds.

Breeding. A substantial platform is built 5-12 m above ground level in a tree in secondary forest, *Erythrina* or plantation cocoa tree.

Movements. Resident.

Status and Conservation. Not globally threatened. On Pagalu very common in 1902 but declined by time of 1959 census; uncommon on Príncipe 80 years ago, but now very common at lower elevations; frequent to uncommon on São Tomé at low and medium altitudes.

Bibliography. Atkinson *et al.* (1994), Bannerman (1953), Dowsett & Dowsett-Lemaire (1993), Dowsett & Forbes-Watson (1993), Fry (1961), Jones, P.J. & Tye (1988), Jones, P.J. *et al.* (1992), Mackworth-Praed & Grant (1970), de Nauris (1994), Rösler (1996), Salvadori (1893), Snow (1978), Urban *et al.* (1986).

50. African Lemon-dove

Columba larvata

French: Pigeon à masque blanc **German:** Zimttaube **Spanish:** Paloma Caripávida
Other common names: Cinnamon/Forest Dove

Taxonomy. *Columba Larvata* Temminck, 1810, Knysna, Cape Province.

A very specialized member of *Columba*, commonly placed in a separate genus, *Aplopelia* (see page 60). Forms a superspecies with *C. simplex*, with which usually considered conspecific, but differs markedly in voice; playback of voice to birds on Príncipe and African mainland elicited no response. Some authors have recognized the two species, but have placed all W African populations (and sometimes birds of race *jacksoni*) in *C. simplex*, retaining E & S African birds only in present species; populations of all Gulf of Guinea islands might be more appropriately placed in *C. simplex*; further investigation required, particularly for all W African populations. Much confusion and uncertainty too at subspecific level: birds of S Cameroon tend to be somewhat darker and have been awarded race *plumbescens*, but doubtfully valid; Liberian population poorly known, and subspecific assignment disputed; birds of Bioko and Pagalu have been awarded separate races, *poensis* and *hypoleuca* respectively; birds of mainland W Africa usually placed in race *inornata*, but with merging of *Aplopelia* in *Columba* this name becomes a junior synonym, and must give way to *hypoleuca*; should populations of Pagalu again be awarded separate subspecific status, mainland form will once again require renaming. Six subspecies tentatively recognized.

Subspecies and Distribution.

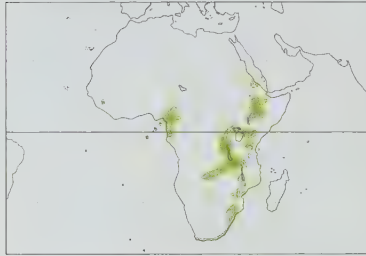
C. l. hypoleuca (Salvadori, 1903) - Sierra Leone and Liberia; SE Nigeria, NW Cameroon and Gabon, Bioko (Fernando Póo) and Pagalu (Annobón).

C. l. principalis (Hartlaub, 1866) - Príncipe.

C. l. bronzina Rüppell, 1837 - Ethiopia and SE Sudan (Boma Hills).

C. l. larvata Temminck, 1810 - S Sudan through Uganda (absent from Ruwenzori), W Tanzania (Mt Mahari) and Malawi to South Africa.

C. l. jacksoni (Sharpe, 1904) - SW Uganda and E Zaire to W Tanzania (Mt Kungwe) and NW Zambia.
C. l. samiliyae (C. M. N. White, 1948) - Angola and NW Zambia.



Descriptive notes. 25-29 cm; male 130-170 g, female 85-134 g. Forehead, face and throat white to greyish white merging into pinkish rufous neck and breast; nape, hindneck, upper mantle and portions of neck side and breast iridescent, varying with incidence of light from bronzy green to mauve-pink to bronzy pink; rest of underparts rufous merging into dark brown flanks and underwing and dark chestnut on undertail-coverts; upperparts and central rectrices dark olive brown suffused with rufous; outer rectrices black with broad grey terminal bands; iris varying from brown to dark brownish red to crimson or pink, sometimes

with white inner ring; orbital skin grey or dark red, with dark red carunculations; bill black, legs red or purplish red. Female tends to be duller, degree of sexual dichromatism varying with race. Juvenile has contour feathers with rust brown and blackish bars, or with blackish subterminal bar and tipped with rufous. Race *bronzina* similar but smaller; *principalis* very similar to nominate but duller, with greyish forehead, lighter underparts and grey to pink undertail-coverts, and also less sexually dichromatic than other western forms, male differing only in more pronounced purplish pink on breast and belly; *jacksoni* larger, with upperparts darker olive brown, breast grey to brownish grey merging into pale grey on underparts, iris mauve or purplish grey, orbital skin grey, female generally paler and duller; *hypoleuca* similar to previous race, but slightly darker; *samiliyae* intermediate between *jacksoni* and nominate in most of colouring, but upperparts darker than either, male purplish black and female dark brown suffused with purple.

Habitat. Lowland and montane evergreen forest; also frequents plantations, large wooded gardens and thickets. Ranges as high as 2100 m in South Africa; in Ethiopia up to 3200 m.

Food and Feeding. Shows certain preference for fruit of *Calodendron capense*; also seeds of bamboo, *Podocarpus* and *Kiggelaria africana*, as well as tubers of a small ground orchid; 17 species of fruit and seeds documented in Malawi and Zambia; termites and snails also sometimes taken. Largely terrestrial, favouring deep shade; forages amongst forest litter where it looks for seeds and fallen fruit.

Breeding. Timing variable regionally: Feb, Apr, Nov in Sierra Leone; Jan, Aug, Oct in Cameroon; Mar-Apr in Ethiopia; probably all months in E Africa, with local variations; recorded in most months, but mainly Nov-Dec in S Africa. Nest is substantial platform of twigs and rootlets, though one consisted only of pine needles; placed 1-9 m (mean 2.5 m) above ground, in tree fork or tangle of creepers, almost always in deep shade; one nest was placed 2 m above ground in a cycad (*Encephalartos*). Usually 2 (1-3) buff or cream-coloured eggs; incubation 14-18 days.

Movements. Resident.

Status and Conservation. Not globally threatened. Species is relatively secretive in habits, so status is difficult to assess accurately; however, generally uncommon and patchily distributed throughout most of range. Destruction of forest is likely to be having negative effects, but some observations indicate that species may be able to adapt to plantations and even gardens with fairly ample cover of trees. In SE Nigeria, first records are from mid-1980's; described as being widespread on Mt Gangirwal. In Sierra Leone, uncommon on Freetown Peninsula; one record from Gola Forest.

Bibliography. Atkinson *et al.* (1994), Bannerman (1953), Benson (1940), Benson & Benson (1977), Britton (1980a), Chapin (1939), Dowsett & Dowsett-Lemaire (1993), Dowsett & Forbes-Watson (1993), Elgood *et al.* (1994), Friedmann (1930a), Fry *et al.* (1985), Gatter (1988), Ginn *et al.* (1989), Jones & Tye (1988), Lewis & Pomeroy (1989), Lippens & Wille (1976), Louette (1981), Mackworth-Præd & Grant (1957, 1962, 1970), Maclean (1993), Muggleston (1993), de Naurois (1994), Nikolaus (1987), Pérez del Val (1996), Rösler (1996), Rowan (1983), Rutgers & Norris (1970), Schuchmann (1985), Serle (1959), Short *et al.* (1990), Smith (1957), Snow (1978), van Someren (1956), Urban *et al.* (1986), Uys (1973), White (1946), Zimmerman (1972), Zimmerman *et al.* (1996).

51. Sao Tome Lemon-dove

Columba simplex

French: Pigeon insulaire German: Sao-Tomé-Taube Spanish: Paloma Sencilla

Taxonomy. *Turtur simplex* Hartlaub, 1849, São Tomé.

A very specialized member of *Columba*, commonly placed in a separate genus, *Aplopelia* (see page 60). Forms a superspecies with *C. larvata*, with which usually considered conspecific, but differs markedly in voice; playback of recordings of São Tomé birds to those on Príncipe and on African mainland elicited no response. Some authors have recognized the two species, but have placed all W African populations (and sometimes birds of *C. l. jacksoni*) in present species, retaining E & S African birds only in *C. larvata*; populations of all other Gulf of Guinea islands might be more appropriately placed in present species; further investigation required, particularly for all W African populations. Monotypic.

Distribution. São Tomé.



Descriptive notes. 28 cm. Forehead white merging into slate on crown latter with amethyst reflections; chin and middle of throat white, cheeks grey; nape and mantle grey with strong bronze, green or pinkish amethyst reflections; sides of neck with coppery sheen; rest of upperparts bronze-brown with purple glossing on wing-coverts, back, rump and uppertail-coverts; primaries and secondaries dark brown as are middle rectrices; rest of rectrices black basally and grey terminally; outermost rectrices paler than inner; middle of belly and ventral regions white, rest of underparts typically grey, but dull rufous in some

birds; faint pinkish amethyst sheen on breast; sides and underwing-coverts slate. Female darker grey on forehead and browner on upperparts; gloss of mantle less extensive; some birds have hindcrown and mantle glossed green, in others green mixed with violet or pink in certain lights; underparts grey-brown, some feathers with a faint cinnamon wash; outer webs of rectrices as in males but washed with brown; undertail-coverts cinnamon. Juvenile male resembles adult female but underparts pale umber-brown washed with rufous or buff, underparts become greyer and belly

whiter with advancing age; juvenile female lighter brown than young male with a pinkish gloss, pinkish or greenish sheen on mantle and sides of head.

Habitat. Inhabits forest and palm groves.

Food and Feeding. No information available.

Breeding. Noted nesting in early Feb. No further information available.

Movements. Resident.

Status and Conservation. Not globally threatened. Very poorly known in all aspects, and no precise information available on status; recent workers have found the species to be fairly common, but nevertheless research and surveys desirable in order to establish details of population size and trends, possible threats, and any conservation measures necessary. Further study also required to clarify taxonomy.

Bibliography. Atkinson *et al.* (1994), Bannerman (1916), Dowsett & Dowsett-Lemaire (1993), Dowsett & Forbes-Watson (1993), Fry *et al.* (1985), Jones & Tye (1988), Mackworth-Præd & Grant (1970), de Naurois (1994), Rösler (1996), Serle (1959), Snow (1978), Urban *et al.* (1986).

Genus NESOENAS Salvadori, 1893

52. Pink Pigeon

Nesoenas mayeri

French: Pigeon rose German: Rosentaube Spanish: Paloma de Mauricio
Other common names: Chestnut-tailed/Mauritius Pigeon

Taxonomy. *Columba Mayeri* Prévost, 1843, Mauritius.

Sometimes placed in the genus *Columba*; however, behavioural studies suggest affinities with *Streptopelia*, and true taxonomic relationships uncertain. Monotypic.

Distribution. Mauritius.



Descriptive notes. 40 cm; male 315 g, female 291 g. Face and forehead white merging into soft light pink on rest of head, neck and underparts; upper mantle brownish pink; belly creamy buff; wings dark brown; a narrow band across mantle same colour; outer webs of primaries edged rufous; upper back dusky pink; rump pale grey merging into chestnut of uppertail-coverts; tail bright chestnut but outermost rectrices pinkish grey with hints of chestnut; iris white to pale yellow; orbital skin reddish pink; bill reddish pink, white-tipped, deep red above nostrils; legs pinkish red. Female duller, rump admixed with brown. Juvenile darker and duller, with feathers buff-tipped, bill and legs dusky purplish grey, rump apricot; iris dark brown.

Habitat. Includes low montane wet forest, dwarf climax forest and low-canopied upland forest. Present species once ranged widely over the whole island, including lowlands, as evidenced by subfossils; today found only above 300 m. Two populations extant, one in an exotic grove of *Cryptomeria japonica* on a scarp below Plaine Paul, and a second at Brise Fer. Pockets of native vegetation are to be found on the scarp where *Calophyllum*, *Sideroxylon puberulum*, *Labourdonnaisia glauca* and *Syzygium* are dominant plants.

Food and Feeding. Although recorded feeding on c. 50 plant species, only a few species comprise bulk of diet, including *Nuxia verticillata*, *Aphloia theiformis*, *Erythrospermum monticolum*, *Lantana camara*, *Pittosporum senecia* and *Diospyros*; the first three of these are widely distributed and probably provide most of the diet biomass for most of the year. Species has adapted to seasonal availability of different food items; observed feeding on flowers of *Antidesma madagaskariense* and leaves of *Tabernaemontana mauritiana* Sept-Dec; but flowers of *Nuxia verticillata* and fruits of *Aphloia theiformis* eaten Jan-Apr. Moderately long bill with hooked tip enables species to pluck flowers and fruits off vegetation, as well as rip off leaves; may grip with strong feet and hang upside down; also feeds on leaves and seeds of grasses, and searches the ground for seeds and fallen fruit; invertebrates also taken, and one bird was seen attempting to catch tadpoles. Feeds both on the ground and in trees and shrubs; usually forages alone, in pairs or family groups.

Breeding. Wild birds tend to start breeding in Dec, with peak in Jan-Jun; breeding decreases during drier months, with few or no birds breeding Aug-Nov; food availability following summer rains triggers breeding activity. Captive birds held on Mauritius breed throughout year, with no peak season. Nest placed 4-15 m above the ground, and consists of sticks lined with finer twigs; most nest material in 20 nests examined consisted of privet (*Ligustrum robustum*), as well as twigs of native trees; nest material may be broken from the ends of branches or taken from the ground; many nests were found to be quite substantially built, approximately 30-35 cm in diameter and 8 cm deep; nest tends to be close to the tree trunk, where often surrounded by dense foliage; an early observer described nests placed in tree-holes, and this may have been far commoner in the pristine forests of the past. Usually 2 eggs, sometimes only 1; incubation 13-15 days; fledging 18-22 days; crop milk comprises the nestlings' diet for the first 3 days; leaves are added on 4th day, and seeds, tender leaves, flowers and fruit added on 5th or 6th days after hatching.

Movements. Widely spread out over range during the day; and birds commonly make trips of 6-8 km from roosting sites in search of food. During flight, wings produce characteristic metallic trumpeting sound.

Status and Conservation. CRITICALLY ENDANGERED. In May 1994, free-living population on Mauritius numbered 77 individuals. Destruction of forests has severely reduced suitable habitat. Captive breeding programme on Jersey (Channel Is, off NW France) is showing success (see page 110); supplementary feeding and rat control are thought to have contributed to the success of the release programme. Other zoos, including Bronx in New York, also have captive breeding programmes. CITES III in Mauritius.

Bibliography. Anon. (1992, 1995i), Bell & Hartley (1987), Bruning (1985, 1989), Cheke (1987), Cheke & Jones (1987), Collar & Andrew (1988), Collar & Stuart (1985), Collar *et al.* (1994), Cooper *et al.* (1988), Diamond, A.W. (1985a), Dowsett & Dowsett-Lemaire (1993), Dowsett & Forbes-Watson (1993), Durrell (1977), Erritzoe (1993), Gillespie (1983), Greenway, J.C. (1967), Hartley (1977), Horne (1987), Jeggo (1977, 1978, 1979), Jones, C.G. (1987, 1996), Jones, C.G., Jeggo & Hartley (1983), Jones, C.G., Swinerton *et al.* (1992), Jones, C.G., Todd

& Mungroo (1989), Jones, C.G., Todd, Swinnerton & Mungroo (1988), King (1978/79), Konstant (1991), Lever (1987), Lind (1989, 1991, 1994), Mallen (1983), McKelvey (1976, 1977), Robiller & Trogisch (1983a, 1984b), Temple (1978b), Todd (1984).

Genus *STREPTOPELIA* Bonaparte, 1855

53. European Turtle-dove

Streptopelia turtur

French: Tourterelle des bois **German:** Turteltaube **Spanish:** Tórtola Europea
Other common names: Common Turtle-dove; Isabelline Turtle-dove (*rufescens*)

Taxonomy. *Columba Turtur* Linnaeus, 1758, India; error = England. Related to *S. lugens*, *S. hypopyrrha* and *S. orientalis*. Birds of Nile Valley and Faiyûm have been separated as race *isabellina*, but claimed differences with *rufescens* probably sexual; in addition, males of this zone may be dimorphic. Four subspecies recognized.

Subspecies and Distribution.

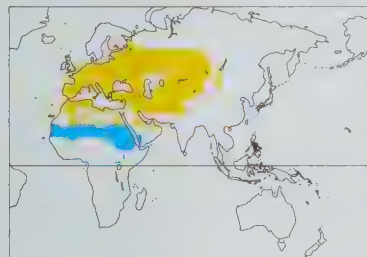
S. t. turtur (Linnaeus, 1758) - C & S Britain E to Poland and N Russia, S to N Mediterranean coast, and on through Asia Minor and Syria to Kazakhstan and W Siberia; also Madeira and Canary Is.

S. t. arenicola (Hartert, 1894) - Morocco E to Tripoli, and from Iraq and Iran E through Afghanistan, Turkestan and Kirghiz Steppes to NW China.

S. t. hoggara (Geyr von Schweppenburg, 1916) - Hoggar and Air Massifs in S Sahara.

S. t. rufescens (C. L. Brehm, 1855) - Dakhla and Kharga Oases in Egypt, as well as Faiyûm and parts of Nile Delta.

Most populations winter in Sahel zone.



Descriptive notes. 27-29 cm; 99-170 g. Forehead pale bluish grey darkening on crown, nape and hindneck; throat white, sides of face pinkish grey; lower throat and breast mauve-pink merging into white on belly and undertail-coverts; flanks pale grey; black, silver-tipped feathers, form a patch on side of neck giving impression of a patch of diagonal black and silver lines; mantle dark brown, often grey tinted, centre of each feather darker forming a scaled pattern; inner wing-coverts and scapulars consist of black feathers with broad orange-buff fringes creating a spotted effect; outer wing-coverts and underwing bluish grey; primaries, outer secondaries and primary-coverts blackish grey; lower back and rump drab tinged with blue-grey; uppertail-coverts and central rectrices greyish drab; outer rectrices dark grey with broad white terminal bar, outermost pair with white outer webs; underside of tail black and white; iris varying from golden yellow to light orange; orbital skin dark purplish blue; bill blackish often with purple tinge, paler toward tip; legs purplish red. Female sometimes indistinguishable, sometimes a little paler and duller in coloration, grey head and pink breast suffused with drab; edges of wing-coverts reddish and less clear. Juvenile tends to be browner and duller overall than adult, with buffish or reddish buff tips to feathers; markings of wing-coverts obscure and neck patch absent or represented by a slight grey area; juvenile male tends to be redder than female. Race *arenicola* slightly smaller and paler; *hoggara* richly coloured with broad, deep orange-buff fringes to wing-coverts, head and rump feathers with sandy tips; in *rufescens*, male mainly rich dark sandy orange on crown and upperparts with breast deep pink, whereas female paler with lighter pink breast often suffused with buff.

Habitat. Wide variety of woodland types, as well as steppe and semi-desert; does not inhabit unbroken forests, preferring forest borders, open woodland and heath with tree clumps. Avoids windy, cloudy and wet regions preferring sunny, dry and sheltered areas; also avoids mountains and in continental Europe thrives below 350 m, rarely ascending to 500 m in temperate zone; further S occurs up to 1000-1300 m. Although tolerates humans does not breed close to towns or villages. Common in forests of holm oak (*Quercus ilex*) and cork oak (*Q. suber*), open red juniper, and *Thuya* forests interspersed with farms; also olive groves and date-palm oases in parts of its range. In its African wintering grounds occupies *Acacia* and *Combretum* savanna, as well as coastal *Suaeda* bush.

Food and Feeding. Seeds and fruits of weeds and cereals comprise most of diet; seeds taken include those of *Brassica*, *Chenopodium*, *Fumaria*, *Helianthus*, *Medicago* and *Triticum*; *Setaria* seeds comprised 42% of diet in one study. Berries and fungi are occasionally eaten; also earthworms, some insects, pupae and small snails. Although largely arboreal, finds most of its food on the ground.

Breeding. Starts May in Europe. Nest is flimsy platform of small twigs, lined with grass stems or roots and leaves, placed in a tree, shrub or hedge; occasionally uses old nests of passerines e.g. Song Thrush (*Turdus philomelos*), Red-backed Shrike (*Lanius collurio*). Lays 2 white eggs; incubation 13-14 days starting with second egg, hatching almost synchronous; fledging 20 days. Has a refractory period (when unresponsive to stimuli) following breeding, unique among all pigeons so far studied. First breeding at 1 year old.

Movements. Strongly migratory in most populations, but a few African birds resident in S of breeding range. Most birds winter from Senegambia to Ethiopia and Eritrea; race *arenicola* has been recorded wintering in NW India on occasion. Birds set off S Jul-Sept/Oct, moving N again Mar-May. Unusual in exhibiting a broad front migratory pattern on its way to its African wintering grounds. Unpredictable and irruptive visitor to some parts of Africa, e.g. Sierra Leone.

Status and Conservation. Not globally threatened. Widespread and still generally fairly common and numerous, with population of Europe (including Turkey) estimated at 2,700,000-13,000,000 pairs; largest populations in Russia and Turkey, each holding 500,000-5,000,000 pairs; other major populations in Spain with 790,000-1,000,000 pairs, France 200,000-450,000 pairs, and Hungary and Poland 100,000-200,000 pairs each. Population declines have been noted in several countries, notably France, Romania and England, with over 50% of breeding pairs lost in each during period 1970-1990; severe drought in Sahel zone thought to be main factor in decline. Hunting also significant, both during migration and in winter quarters; 10,000's killed annually in Senegal, with annual toll in France computed at 40,000 birds, in Morocco 15,000 birds. Transformation of agricultural land, including destruction of hedges, may also be important; widespread use of chemical herbicides appears to be a very serious factor, with consequent decline or elimination of many food plants. CITES III in Ghana.

Bibliography. Ali & Ripley (1981), Arhazaf & Franchimont (1994), Ash (1977), Aspinall (1996a), Bannerman (1953), Berck (1974), Bourne & Beaman (1980), Cederwall (1978), Chaves (1978/79), Cramp (1985), Curry (1974), Devort *et al.* (1988), Dimitrijevic (1982), Dowsett & Forbes-Watson (1993), Elgood *et al.* (1994), Échécopar & Hue (1964, 1978), Evans, M.I. (1994), Flint *et al.* (1984), Freitag & Meitz (1977), Genard (1989, 1990), Giraudoux *et al.* (1988), Glutz von Blotzheim & Bauer (1980), Goodman *et al.* (1989), Gore (1990), Hue & Échécopar (1970), Jännes (1995), Jarry (1994), Jennings (1995), Jiménez *et al.* (1992), Khanmamedov (1985), Kozlov (1988), Kraus *et al.* (1972), Marchant *et al.* (1990), Möller (1976), Morel, G.J. & Morel (1979, 1988), Morel, M.Y. (1980, 1985, 1986, 1987), Mountfort (1981), Murta (1981, 1983), Murtón (1964, 1968, 1971a), Murtón *et al.* (1964), Nankinov (1994a, 1994b), Nikolaus (1987), Paz (1987), Peiró (1990), Pikula & Beklová (1984), Porter *et al.* (1996), Purroy (1995), Rösler (1996), Rutgers & Norris (1970), dos Santos (1979/80, 1983a, 1983b), Schofield (1985), Shirihai (1996), Simeonov *et al.* (1990), Skinner (1987), Snow (1978), Stepanyan (1990a), Tyler (1994), Urban *et al.* (1986), Winterbottom (1974).

54. Dusky Turtle-dove

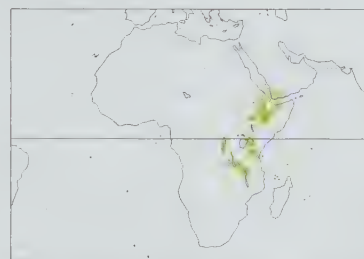
Streptopelia lugens

French: Tourterelle à poitrine rose **German:** Trauerturteltaube **Spanish:** Tórtola Oscura
Other common names: Black/Pink-breasted Dove

Taxonomy. *Columba lugens* Rüppell, 1837, Taranta Mountains, Eritrea.

Forms a superspecies with *S. hypopyrrha*, with which sometimes considered conspecific; also related to *S. turtur* and *S. orientalis*. Monotypic.

Distribution. SE Sudan, W & SE Ethiopia, Eritrea and Somalia to Uganda, whence patchily SW through mountains of Rift Valley to N Malawi, and SE through Kenya highlands to NE Tanzania; also SW Arabia.



Descriptive notes. 28 cm; male 140-205 g, female 120-190 g. Appears predominantly greyish blue with black neck patches and bright orange-buff wing markings. Head, neck and underparts dark bluish grey with a tinge of lavender; throat pale buff; lower breast pinkish; black patch on side of neck; mantle, back, some of inner wing-coverts, centre of rump and uppertail-coverts dark brownish grey with light grey or rufous fringes on most of feathers; inner secondaries and inner greater-coverts with orange-buff or light chestnut edges on outer webs; outer secondaries, primary-coverts and primaries black with narrow pale edges; central rectrices dark brownish grey, outer rectrices black with pale grey tips; iris ranges from brownish orange to orange to golden; orbital skin varying from blue-grey to purple to purplish red; bill black, dark grey or purplish black basally, tip paler; legs brownish red, purplish red or dark purple. Female tends to be slightly duller and paler, some have yellow irides. Juvenile tends to be paler and browner throughout, most of feathers a dark drab with pale rufous edges, inner primaries and inner secondaries with broad rufous edges.

Habitat. Mainly a bird of montane forest 1800-3200 m. Frequents woodland of *Juniperus*, *Eucalyptus*, *Cedrus*, *Hagenia* and bamboo; also gardens, pine plantations, cultivated areas and lower heath zone.

Food and Feeding. Feeds on weed seeds, cereals, sunflowers, *Salvadora* berries, small rhizomes, insects and molluscs; food collected on ground. May form flocks of up to birds 100 outside breeding season.

Breeding. Mainly in dry season in Ethiopia, but recorded all months except Jul-Aug; recorded in most months, but with local variations in E Africa. Nest is loose platform of criss-crossed twigs, sometimes lined with fine rootlets, placed 2-7 m above ground. Lays 2 white eggs; incubation c. 20 days, by both sexes; chicks grow quickly, and are large and well feathered by 10 days old.

Movements. Sedentary, but with some tendency towards vagrancy. In Ethiopia, probably descends to lower elevations during rains, when can be found as low as at 200 m.

Status and Conservation. Not globally threatened. No precise details available, but reported to be frequent to common or even abundant through Ethiopian highlands, and similarly throughout E African part of range; uncommon in Malawi. No threats known.

Bibliography. Ash & Miskell (1983), Benson & Benson (1977), Britton (1980a), Brooks *et al.* (1987), Cheesman & Sclater (1935), Cornwallis & Porter (1982), Dowsett & Dowsett-Lemaire (1993), Dowsett & Forbes-Watson (1993), Evans, M.I. (1994), Friedmann (1930a), Goodman & Jennings (1988), Hollom *et al.* (1988), Jennings (1995), Johnston-Stewart & Heigham (1982), Lewis & Pomeroy (1989), Lippens & Wille (1976), Mackworth-Præd & Grant (1957, 1962, 1970), Nikolaus (1987), Phillips (1982), Porter *et al.* (1996), Rösler (1996), Short *et al.* (1990), Smith (1957), Snow (1978), van Someren (1956), Urban & Brown (1971), Urban *et al.* (1986), Zimmermann *et al.* (1996).

55. Adamawa Turtle-dove

Streptopelia hypopyrrha

French: Tourterelle de l'Adamawa **German:** Adamauturteltaube **Spanish:** Tórtola del Camerún
Other common names: Pink-bellied Turtle-dove

Taxonomy. *Turtur hypopyrrhus* Reichenow, 1910, Benue River, Adamawa.

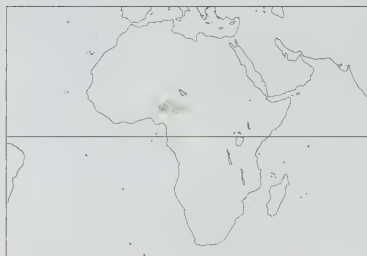
Forms a superspecies with *S. lugens*, with which sometimes considered conspecific; also related to *S. turtur* and *S. orientalis*. Monotypic.

Distribution. NC & E Nigeria, N Cameroon and extreme SW Chad; also recorded in Senegal, recently Gambia, and Togo, but status unclear.

Descriptive notes. c. 30 cm. Forehead, face and throat silver-grey; crown, nape, neck and breast bluish grey; a black patch on side of neck; lower breast and belly dark pink with a purplish tinge; flanks, sides of rump, undertail-coverts and underwing dark bluish grey; mantle, back, rump and uppertail-coverts dark greyish brown with indistinct reddish buff fringes; inner wing-coverts and inner secondaries blackish brown with buff edging, outer wing-coverts with grey and buff or grey edgings; primaries and outer secondaries dark greyish brown outer webs with narrow pale edgings; iris with inner ring pink or orange, outer ring dark; orbital skin dark red; bill black; legs purplish black. Female paler and duller. Juvenile also paler than male with rufous fringes to feathers.

Habitat. Inhabits edges of dense woods in rolling upland country, as well as wooded ravines; also found in suburban and rural areas.

Food and Feeding. Feeds on small seeds; nothing further known of diet. Forages mostly on the ground, singly when breeding, but in flocks of up to 60 individuals when breeding completed.



Breeding. Eggs Mar-Nov in NC Nigeria, but season probably long. Builds a thin flat loose platform nest, 15 cm in diameter, placed 4-5 m above ground. Lays 2 white eggs.

Movements. Generally sedentary, with some local movements. Also reported to be nomadic; recent records from Togo and Senegal may be evidence of this tendency.

Status and Conservation. Not globally threatened. In Nigeria, found mainly on Jos Plateau in NC of country; reported to be frequent at Falgore Game Reserve, but rare further S in Nindam Forest Reserve, a few birds occurring around Kaduna, Kari and Potiskum; less common

than very widespread and locally sympatric *S. senegalensis* and *C. guinea*. In Togo, single record of a bird present Mar-May 1988, behaving as if defending territory. Also recently recorded at Niokolo-Koba in Senegal, where one bird heard, trapped and photographed in Jan-Feb 1991. In Cameroon, apparently uncommon at best, and not recorded at all during fieldwork spread over 8 years in 1970's.

Bibliography. Baillon (1992), Bannerman (1953), Bates (1930), Borrow (1997), Cheke & Walsh (1989), Dowsett & Dowsett-Lemaire (1993), Dowsett & Forbes-Watson (1993), Elgood *et al.* (1994), Louette (1981), Mackworth-Praed & Grant (1970), Robertson (1992), Smith (1966), Snow (1978), Sørensen *et al.* (1996), Urban *et al.* (1986), Wood (1975), Woods (1967).

56. Oriental Turtle-dove

Streptopelia orientalis

French: Tourterelle orientale **German:** Orientturteltaube **Spanish:** Tórtola Oriental
Other common names: Eastern/Rufous/Mountain Turtle-dove

Taxonomy. *Columba orientalis* Latham, 1790, China.

Related to *S. turtur*, *S. lugens* and *S. hypopyrrha*. Six subspecies recognized.

Subspecies and Distribution.

S. o. meena (Sykes, 1832) - S part of W Siberia to W Altai, S to Turkestan, Iran, Afghanistan, Kashmir and Himalayas E to W Nepal; winters mainly in India.

S. o. orientalis (Latham, 1790) - C Siberia through Transbaikalia, Amurland and Sakhalin to Kuril Is, Japan and Korea, and S through much of China to Himalayas, N Assam, Yunnan, Guangdong, Hainan and N Vietnam; winters in S & E Asia.

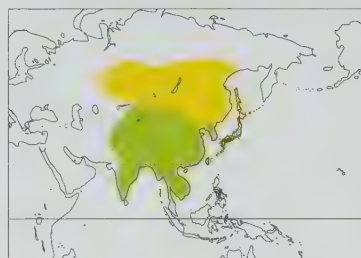
S. o. simpsoni (Stejneger, 1887) - Ryukyu Is (Amami-oshima S to Senkaku Is).

S. o. orii Yamashina, 1932 - Taiwan.

S. o. erythrocephala (Bonaparte, 1855) - Peninsular India.

S. o. agricola (Tickell, 1833) - NE India (Bihar, Orissa, Bengal, S Assam) E to Myanmar (S to Tenasserim) and SC China (W Yunnan, Hainan).

Descriptive notes. 33-35 cm; 165-274 g. Forehead bluish grey merging into brownish grey with a rufous wash on nape and pinkish on face; throat pale buff merging into greyish pink on neck and breast; a black patch on side of neck, each feather tipped with grey; belly pinkish buff, ventral regions whitish and undertail-coverts pale grey; hindneck dark grey feathers with rufous buff edgings; mantle feathers as on hindneck but with blackish centres to each; wing-coverts, scapulars and inner secondaries with dark centres more extensive than in *S. turtur*; inner secondaries and scapulars edged with orange-buff or light chestnut; elsewhere feathers edged with bluish grey or feathers have black centres edged with pinkish fawn with a grey subterminal area; primaries black with pale



edges; rump and underwing dark bluish grey; uppertail-coverts dark grey tipped with paler grey; central rectrices blackish grey or dark brownish grey; outer rectrices black with pale grey tips. web of outermost pale grey; iris varies from light red to orange-red to orange or golden; orbital skin dark purple or dark pinkish; bill mostly black, grey or dull purple but dark red or purplish at gape edges and base, pale horn coloured at tip; legs range from dark pink to reddish purple to purple. Female usually duller on neck and breast; greyish pink of male replaced by salmon buff. Juvenile similar to that of *S. turtur* but darker, dark greyish

brown overall feathers of back, wings and breast conspicuously edged with rufous-buff. Race *simpsoni* has darker underparts; *orii* duller than nominate; *erythrocephala* smaller, has very rufous underparts, a rich pinkish rufous head and neck and a deep rusty pink breast; *agricola* also more rusty than nominate but not as much as *erythrocephala*; race *meena* brighter than nominate, with rufous fringes on wing-coverts, belly and undertail-coverts, terminal tail band white.

Habitat. Occupies a wide variety of habitats ranging from boreal to tropical forests. In Japan, frequents forest edge and in mountainous regions found up to subalpine zone; also occurs in sparse woodland, scrub and wooded farmland bordering cultivated fields; appears to be increasing as an urban breeder in Japan in areas with tree-lined streets. In Kashmir, breeds in glades of pine mixed with birch (*Betula*), aspen and poplar (*Populus*) and willow (*Salix*) groves; also in oak, mixed deciduous and bamboo forests in foothills. At times has been found as high as 2400 m on Mt Fuji, and up to 4000 m in Nepal.

Food and Feeding. Raids paddyfields, and also feeds on cereals and pine seeds; also herbs, bamboo shoots and green shoots of various plants. In former USSR, observed plucking berries from *Prunus* trees. Most feeding is on the ground.

Breeding. Season prolonged, May-Aug in N parts of range, Nov-Feb in S India. In India builds a typically flimsy dove nest of twigs placed in a sapling, scrubby bush or bamboo clump, with most nests 2-4 m above ground; on Hokkaido, N Japan, early nests placed in conifers, but in late Jun new nests situated in deciduous trees, by then in leaf, with 80% at least 1-3 m above the ground; on Okinawa, in *Casuarina*, *Pinus* or *Ficus* 2.5-4.5 m above ground; in Kashmir, in spruce (*Picea*), but also junipers or cedars, and wide range of other trees. Normally 2 white eggs, occasionally 1; incubation 15-16 days; fledging 15-17 days.

Movements. Populations of N Asia from Siberia to Japan and Kuril Is migrate S to winter in S & E Asia from India to S & E China and S Japan. Generally resident in S Asia, but some populations are migratory; Himalayan and other N Indian populations migrate S to Peninsular India to overwinter. Winter range poorly known, partly due to complications of subspecific identification.

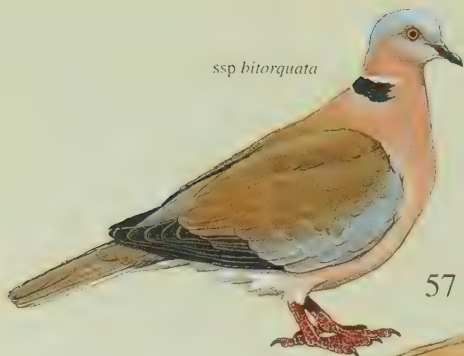
Status and Conservation. Not globally threatened. Widespread and generally common throughout extensive range covering most of Asia, though quantitative data lacking; expanding into tree-lined streets of cities in Japan. However, populations have been reduced by overhunting in some regions, especially in areas close to human habitation.

Bibliography. Ali (1962, 1996), Ali & Ripley (1981), Baker (1913), Bates & Lowther (1952), Brazil (1991), Cramp (1985), Deignan (1945), Étiécopar & Hüe (1978), Flint *et al.* (1984), Haneda & Nozawa (1969), Hirschfeld (1986, 1992), Hirschfeld & Svensson (1985), Hüe & Étiécopar (1970), Inskipp & Inskipp (1991), Jahn (1942), Jännes (1995), Kameda (1994, 1996a, 1996b), Kawaji (1994), Knystautas (1993), Kotov (1974, 1976b), Lekagul & Round (1991), Loterijman (1968), Matsuoka & Nakamura (1987), Murakami & Fujimaki (1983), Nakamura & Matsuoka (1984, 1987, 1991), Nakao (1984a, 1984b), Pang Bingzhang (1983), Ripley (1982), Roberts, T.J. (1991), Rogacheva (1992), Rutgers & Norris (1970), Schäfer (1938), Smythies (1986), Stepanyan (1990a), Terauchi *et al.* (1985), Wada (1992, 1994a, 1994b), Yamashina (1961), Yang Lan *et al.* (1995).

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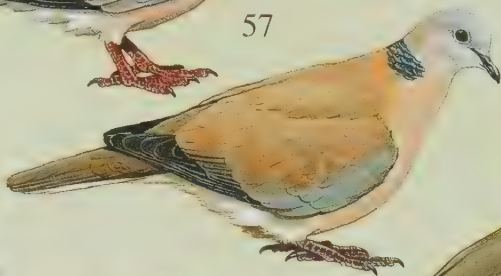
PLATE 7

ssp bitorquata



57

ssp dusumieri



ssp decueto

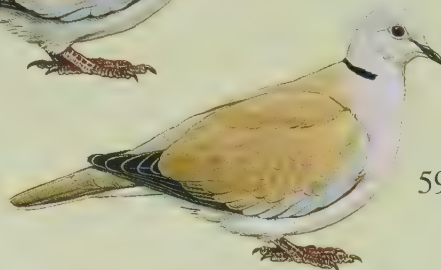


58

ssp xanthocyclus



59

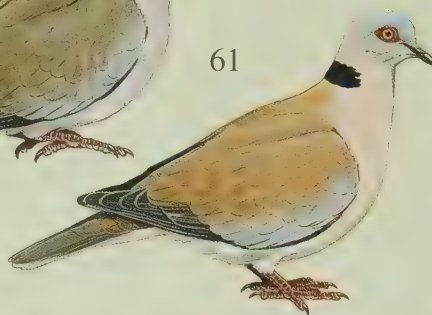


ssp decipiens

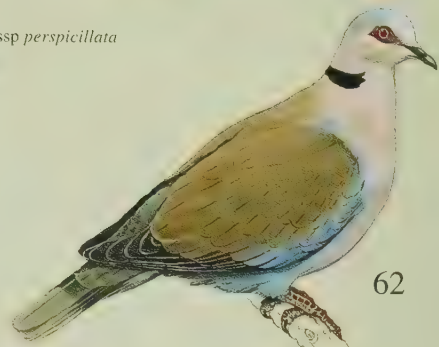


61

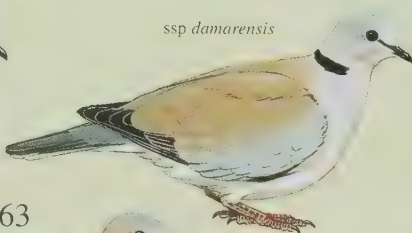
ssp perspicillata



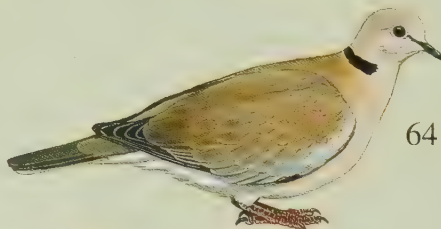
62



ssp damarensis



64

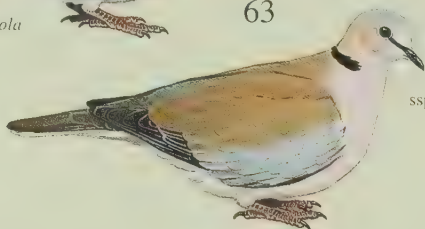


ssp capicola

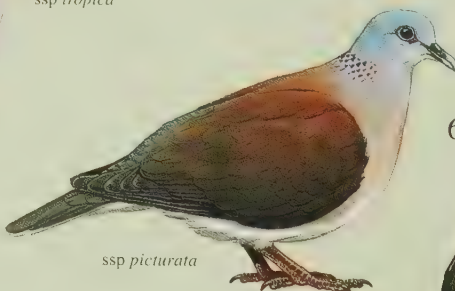


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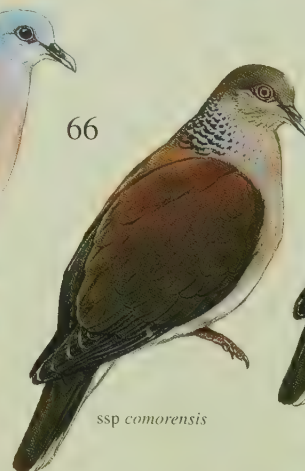
ssp tropica



66



ssp picturata



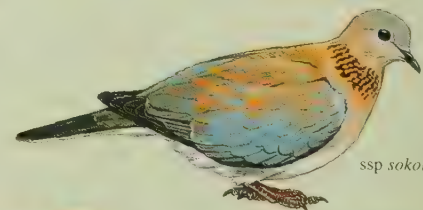
ssp copperingi



ssp rostrata

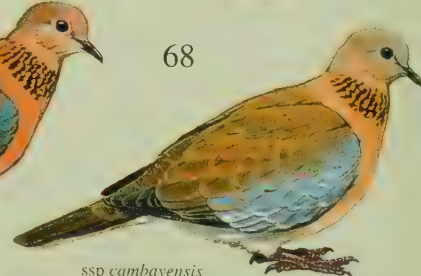


ssp comorensis



ssp sokotrae

68

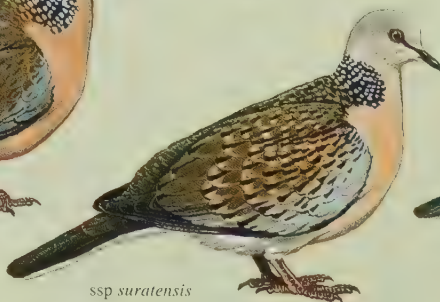


ssp senegalensis



ssp cambayensis

ssp suratensis

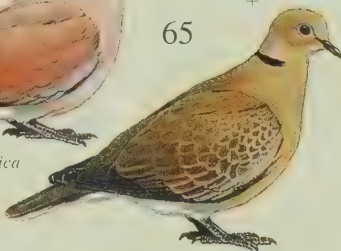


ssp chinensis

67



ssp tranquebarica



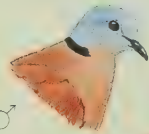
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ssp humilis



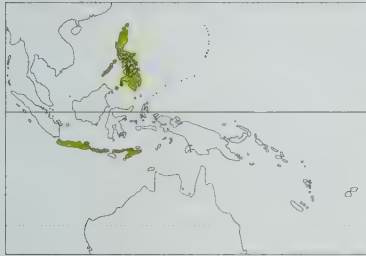
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57. Island Collared-dove

Streptopelia bitorquata

French: Tourterelle à double collier **German:** Kichertaube **Spanish:** Tórtola Bicollar
Other common names: Philippine Turtle-dove

Taxonomy. *Columba Bitorquata* Temminck, 1810, Timor.
Forms a superspecies with *S. decaocto*, *S. roseogrisea* and *S. reichenowi*. Two subspecies recognized.
Subspecies and Distribution.
S. b. dusumieri (Temminck, 1823) - Philippines; also recorded on N Borneo.
S. b. bitorquata (Temminck, 1810) - Java and Bali through Lombok, Sumbawa, Komodo, Flores and Solor to Timor.
Introduced (*dusumieri*) to North Mariana Is.



entirely pale grey; underside of tail greyish white, black on basal third; iris yellow, orange or orange-red; orbital skin red; bill black or dark grey, gape red; legs purplish or pinkish red. Sexes alike. Juvenile paler and duller wine-pink replaced by dusky fawn: neck markings indistinct and confined to sides of neck. Race *dusumieri* differs in being duller and paler; head pinkish grey and half-collar dark grey with a greenish sheen, white edging indistinct; hind neck below collar suffused with rusty or coppery tinge; outer webs of outermost rectrices white; belly and undertail-coverts creamy white; iris brown to orange brown.

Habitat. Found mainly in mangroves, but generally inhabits open, wooded country; also frequents cultivated and urban areas. Typically in lowlands, rarely occurring above 600 m.

Food and Feeding. Feeds mostly on seeds, but details of food preferences are lacking. Takes most of its food from the ground.

Breeding. Recorded Mar-May. Nest is a flimsy, shallow platform of small twigs. Lays 2 white eggs; incubation 17-18 days; fledging 16-19 days. In one study on Guam, where introduced, nests suffered severe predation from brown tree snakes (*Boiga irregularis*), also introduced; nesting success was only 2-5% in urban areas, and 0-3% in forest habitat.

Movements. Generally sedentary, but occasional sightings from N Borneo are believed to refer to vagrants from Philippines.

Status and Conservation. Not globally threatened. Little known, and requires detailed study. Seems to be becoming scarcer in Philippines, as *S. chinensis* expands its range; reported still to be common in parts of Lesser Sundas. On Guam (North Marianas), where introduced in 1970's, population has been decimated by introduced snakes, indicating potential danger to natural populations of introduced predators.

Bibliography. Anderson, R. (1981), Anon. (1966, 1968), Baker (1947, 1951), Bishop (1992), Coates & Bishop (1997), Conry (1987, 1988a, 1988b), Delacour & Mayr (1946), Dickinson *et al.* (1991), Gibbs (1990), Hellebrekers & Hoogerwerf (1967), Lever (1987), MacKinnon (1988), MacKinnon & Philipps (1993), Mason (1989), Mayr (1944b, 1945b), McGowan *et al.* (1964), Pérez (1969, 1970), Pratt *et al.* (1979, 1987), Rabor (1977), Rand & Rabor (1960), Ripley & Rabor (1956), Rösler (1996), Smythies (1981), Stepanyan (1995), Stopflet (1946), White & Bruce (1986).

58. Eurasian Collared-dove

Streptopelia decaocto

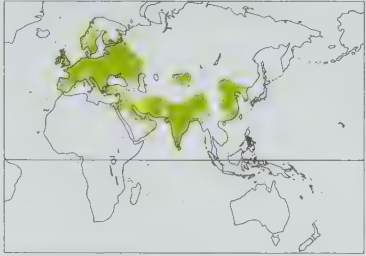
French: Tourterelle turque **German:** Türkentaube **Spanish:** Tórtola Turca
Other common names: Eastern/Eurasian/Indian Ring-dove, Collared Turtle-dove

Taxonomy. *Columba risoria* Linnaeus var. *decaocto* Frivaldszky, 1838, Turkey.
Forms a superspecies with *S. bitorquata*, *S. roseogrisea* and *S. reichenowi*; sometimes considered conspecific with *S. roseogrisea*. Proposed race *stoliczkae* of Chinese Turkestan based on feral birds. Two subspecies currently recognized.

Subspecies and Distribution.
S. d. decaocto (Frivaldszky, 1838) - Europe to Asia Minor, Turkestan and N China and S to NE Africa, Palestine, Iraq, Iran, India, Sri Lanka and W China.
S. d. xanthocyclus (Newman, 1906) - Myanmar, Shan States, Yunnan and E China.
Introduced to Japan (possibly natural) and USA; European birds also sometimes claimed to originate from introductions.

Descriptive notes. 30-32 cm; male 150-196 g, female 125-196 g. Forehead and crown pale grey often merging into vinous-buff on nape and hindneck; mantle sandy brown; black half-collar crosses hindneck bordered by white above and below; lores and ear-coverts pale grey merging into vinous on chin, throat, sides of neck and breast; belly and flanks pale grey, darker on undertail-coverts; mantle, back, scapulars, lesser wing-coverts, tertials and tail sandy grey-brown; alula, greater and primary coverts and secondaries pale grey, latter with brownish grey tips; primaries dusky brown, underwing greyish white; outer rectrices dark grey basally, pale grey distally with broad greyish white tips; iris deep red; orbital ring cream; bill black; legs mauve-red. Sexes alike. Juvenile lacks neck collar and sandier all over, feathers of upperparts with narrow buff margins. Race *xanthocyclus* darker with bright yellow versus white orbital skin.

Habitat. In its original range in India, Sri Lanka, Myanmar and other parts of Asia inhabits semi-desert and arid country with scattered trees such as *Acacia*; these populations tend to avoid city



centres and moist evergreen tracts. Elsewhere, occurs in towns and cities, parks, orchards and gardens. In mountains of Kurdistan, found in poplar (*Populus*) thickets, bramble (*Rubus*) clumps, tamarisk (*Tamarix*) groves and orchards; in most of Iraq, no nests found more than 1 km from a house.

Food and Feeding. Takes seed, cereal grain, fruits of herbs and grasses and some green parts of plants; c. 30 food plants have been identified, including grains such as wheat (*Triticum*), maize (*Zea*) and oats (*Avena*); seeds taken include those of knotgrass (*Polygonum*), amaranth (*Amaranthus*) and wild mustards (*Brassica*).

Beetles, flies and small molluscs are also taken, as are aphids and lepidoptera larvae. Although most food is taken on the ground, birds may fly up with rapid wingbeats to pluck berries from bushes and trees.

Breeding. Season prolonged but mainly Mar-Oct in cooler parts of range; in S breeds all year round. Nest is a flimsy platform made of twigs, stems and roots; may be bulky at times and materials added when rearing 2nd and later broods; placed 2-22 m above ground in bushes, trees, tall hedges and such man-made structures as pylons, buildings, roof troughs or gutters. Lays 2 white eggs; incubation 14-16 days; fledging 15-19 days, though occasionally young may stay in the nest for as long as 24 days. In one study in Czechoslovakia 79.3% of hatched young fledged successfully; in another study conducted in Iraq, of 77 eggs laid, 67.4% hatched and only 35% were raised to fledging.

Movements. Generally resident throughout extensive range; however, altitudinal movements known in Himalayas of Pakistan and N India, where birds descend to lower ground Nov-Mar. Ringing studies have indicated that most young disperse less than 300 km from hatching site, although a few known to have dispersed 400-500 km; dispersal distances of over 1000 km are rare.

Status and Conservation. Not globally threatened. Common to abundant throughout much of its extensive range, e.g. in mid-1980's population of West Germany estimated at 550,000-670,000 pairs. A very successful species that, beginning in 1930's, has spread from its original homelands in S Asia to parts of Asia Minor and Africa, and much of Europe: in Netherlands, increased from 5 pairs in 1950 to 60,000-100,000 pairs in 1975-1977; Britain colonized in 1955, but already by 1972 population up to 30,000-40,000 pairs. Locally abundant in much of India, e.g. in Rajasthan; abundant to very abundant in Pakistan. Introduced to USA, where long virtually confined to Florida, having arrived thither from Bahamas; now appears to be spreading rapidly N, and in May 1997 recorded in New York, with other recent reports from Louisiana, Texas, Colorado, Oklahoma, Kansas, Illinois, Tennessee, North Carolina, Georgia and New Jersey; many of these records may refer to local escapes, especially reports from California, Montana and Nova Scotia, but, whatever the precise origins in each case, colonization appears to be occurring very rapidly, and merits careful documentation.

Bibliography. Ali (1996), Ali & Ripley (1981), Aspinall (1996a), Ballintijn & ten Cate (1997), Barcena & Domínguez (1986), Barré *et al.* (1996), Bentz (1982), Beretz & Keve (1973), Bernis *et al.* (1985), Bozsko (1978, 1983), Bozsko & Juhasz (1984), Brazil (1991), ten Cate (1992), ten Cate *et al.* (1992), Coombs *et al.* (1981), Cordero-Tapia *et al.* (1985), Cramp (1985), Dhanda & Dhindsa (1993), Dyrce (1956), Étchécopar & Hüe (1964, 1978), Evans, M.I. (1994), Fisher (1953), Flint *et al.* (1984), Glutz von Blotzheim & Bauer (1980), Gnielka (1975), Goodman & Houlihan (1981), Goodman *et al.* (1989), Górski (1987, 1991, 1992), Górski (1993), Górski & Górski (1991), Gürtler (1973), Heer (1975), Hengeveld (1993a, 1993b), Hengeveld & van den Bosch (1991), Hock (1963), Hofstetter (1952, 1954), Hüe & Étchécopar (1970), Imboden (1973), Jaeschke & Moenke (1988), Jennings (1995), Kasperek (1996a, 1996b), Kinzelbach (1993), Kiss & Rékási (1981), Kneis & Goerner (1981), Knystautas (1993), Lachner (1963), Lever (1987), Liu Zuomo (1965), Marchant *et al.* (1990), Mlikovsky & Svec (1984), Mukherjee (1995), Murtin *et al.* (1973), Nowak (1965, 1974, 1975, 1989), Oehme & Franz (1987), Paz (1987), Phillips (1978), Pikula & Beklová (1984), Porter *et al.* (1996), Radford (1987), Rana (1973, 1975, 1976), Reichholf (1976), Ripley (1982), Roberts, T.J. (1991), Robertson (1988a, 1990), Roonwal (1940), Rutgers & Norris (1970), Satheesan *et al.* (1990), Saini (1993), Saxena & Mathur (1979), Scharlau (1991), Shirihi (1996), Simeonov *et al.* (1990), Smith, P.W. (1987), Smythies (1986), Stepanyan (1990a), Stotz *et al.* (1996), Stresemann & Nowak (1958), Sueur (1982), Urban *et al.* (1986), Williams (1986), Yang Lan *et al.* (1995).

59. African Collared-dove

Streptopelia roseogrisea

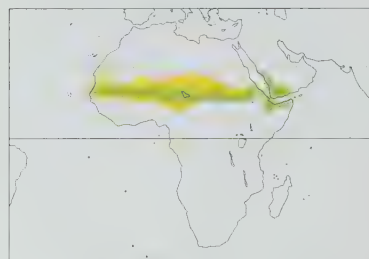
French: Tourterelle rieuse **German:** Lachtaube **Spanish:** Tórtola Rosigrís
Other common names: Pink-headed Dove, Rosy-grey Turtle-dove; Barbary Dove ("*risoria*")

Taxonomy. *Columbam roseogriseam* [sic] Sundevall, 1857, Nubia.
Forms a superspecies with *S. bitorquata*, *S. decaocto* and *S. reichenowi*; sometimes considered conspecific with *S. decaocto*. Domesticated form, sometimes referred to as "*S. risoria*", has been subject of many studies on genetics, psychology, ethology, neurophysiology and notably endocrinology. Populations W of L Chad sometimes awarded separate race, *bornuensis*. Two subspecies recognized.

Subspecies and Distribution.
S. r. roseogrisea (Sundevall, 1857) - SW Mauritania and Senegambia E through Mali, Niger, Chad and Sudan to W Ethiopia.
S. r. arabica (Neumann, 1904) - coastal Eritrea and Somalia, and Arabia from Jiddah to Aden (S Yemen).

Descriptive notes. 26 cm; 130-166 g. Upperparts pale greyish fawn, outermost secondary-coverts and primary-coverts blue-grey, primaries black; two central rectrices greyish drab; head, neck and breast mauve-pink merging into white on chin and belly; black half-collar edged with white; underwing-coverts white; outermost rectrices grey above with white tips but black below and white-tipped; iris red; orbital skin pale grey; bill black; legs purplish red. Sexes alike. Juveniles paler and duller, contour feathers with paler edges and legs dull greyish; iris colour changes from yellow through orange to red of adult. Race *arabica* usually darker with pale grey underwing-coverts.

Habitat. Dry zones of xerophilous thornbush scrub, or open desert with annual grasses; also occupies sandy riverbeds and farmland, never more than 25 km from a water source; however, appears capable of surviving long periods without water; berries may at times provide moisture requirements. Avoids riparian and other kinds of forest. Generally found below 1000 m.



Food and Feeding. Seeds (weighing 0.24-892 mg) of grasses and other plants make up most of diet; also takes other vegetable matter, insects and some snails. In S Sahara, main seed consumed is that of the euphorbiaceous plant *Chrozophora*. A study in Senegambia identified seeds from 68 plant species in the diet; in wet years, 75% of food by weight consisted of monocotyledons, mainly *Panicum laetum*; in dry years, fed mainly on dicotyledons, with up to 80% of diet consisting of *Tribulus terrestris*. Food taken on the ground; encountered in pairs or groups of up to 25 and sometimes in flocks of hundreds by water sources;

roosts may contain thousands of individuals.

Breeding. Recorded in all months in Senegambia and Mali; Sept-Oct in Chad; Dec-June in Sudan; and Dec-Feb in Ethiopia. Nest is frail, open cup in a tree or bush, on average 2.5 m above the ground; nests may be 20 km from the nearest water source. Study in Senegambia revealed that most nests were placed in *Balanites aegyptiaca*, but also used were *Acacia raddiana*, *Grewia bicolor*, *Commiphora africana* and 7 other species of trees; old nests of other species were sometimes utilized. Usually 2 eggs, sometimes 1; incubation 14-15 days; fledging 15 days.

Movements. Sedentary in most of its range, but populations at N & S limits are migratory. Large movements in flocks have been observed in Mali at beginning and end of wet season. Non-breeding migrants visit Nigeria in dry season between mid-Oct and May; they remain in thorn-scrub savanna and then leave with onset of summer rains; other Nigerian populations resident.

Status and Conservation. Not globally threatened. Abundant in various parts of range, occurring in flocks of thousands of individuals. Occupies habitat where human population generally rather sparse; extent of suitable habitat increasing with progressive desertification of Sahel zone. In N Senegal, densities of 1.4-7 birds/10 ha recorded in 1970's; in Nigeria, common resident at Hadejia Wetlands; in Cameroon, common at Waza National Park. CITES III in Ghana.

Bibliography. Ash & Miskell (1983), Bannerman (1953), Baptista (1996), Bates (1927, 1934), Bennett (1940), ten Cate & Hilbers (1991), ten Cate & Taborsky (1992), Cezilly & Brun (1989), Chambers (1989), Cheng Meifang (1993), Craig (1909), Cramp (1985), Davies (1970, 1974), Dawe (1984), Desportes *et al.* (1991), Dowsett & Forbes-Watson (1993), Elgood, Fry & Dowsett (1973), Elgood, Heigham *et al.* (1994), Erickson (1966, 1973), Erickson & Morris (1973), Evans, M.J. (1994), Friedmann (1930a), Giraudeau *et al.* (1988), Goodman *et al.* (1989), Gore (1990), Guilmette (1974), Hatch (1991), Higgins & Davies (1996), Hirose & Balsam (1995), Hutchinson & Lovari (1976), Jennings (1995), Lehrman (1964), Louette (1981), Lovari & Hutchison (1975), Lynes (1925), Mackworth-Praed & Grant (1957, 1970), Mairy (1976), McDonald (1976), Michel & Moore (1986), Miller, S.J. (1966), Miller, W.J. & Miller (1958), Montevecchi (1974), Moore (1976), Morel, G.J. & Chappuis (1992), Morel, G.J. & Morel (1972), Morel, M.Y. (1980, 1983a, 1983b, 1992), Morris & Erickson (1971), Nikolaus (1987), Porter *et al.* (1996), Rissman (1983), Robertson (1985), Root (1988), Shirihai (1996), Smith, P.W. (1987), Snow (1978), Urban & Boswell (1969), Urban *et al.* (1986), Vennier (1986), Vowles & Prewitt (1971), Werts (1980), White (1975a, 1975b, 1975c), Zenone *et al.* (1979).

60. White-winged Collared-dove

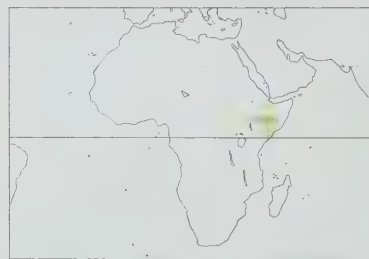
Streptopelia reichenowi

French: Tourterelle de Reichenow **German:** Reichenowtaube **Spanish:** Tórtola de Reichenow
Other common names: Reichenow's Dove, White-winged Ringed-dove

Taxonomy. *Turtur reichenowi* Erlanger, 1901, Somalia.

Forms a superspecies with *S. bitorquata*, *S. decacoto* and *S. roseogrisea*. Monotypic.

Distribution. SE Ethiopia and along R Juba in SW Somalia, along with all its Ethiopian tributaries.



Descriptive notes. 25 cm; 98-135 g. Head dark bluish grey merging to a paler hue on face, breast and flanks; some feathers of head tipped with brown; throat, belly and undertail-coverts creamy white; upperparts brown, a broad black half-collar separating grey head from brown mantle; outer wing-coverts pale blue-grey with broad white fringes on most of feathers, thus forming a white band across open wing; primaries and primary-coverts brown; central rectrices brown, other rectrices brown with grey edges and white tips; basal third of rectrices black and undersides grey-white; iris yellow or silvery orange; bill black; legs pink.

Female has grey areas suffused with brown. Juvenile paler and browner with most of feathers buff or tawny tinged.

Habitat. In SE Ethiopia, inhabits broad-leaved trees within 2 km of rivers. In Somalia, only occurs in riparian woodland of doum and fan palms (*Hyphaene*, *Borassus aethiopicum*); avoids neighbouring *Acacia* bush.

Food and Feeding. Red berries have been found in birds' crops. No further information available.

Breeding. Jan-Feb in Ethiopia. Nest is a loose, 15 cm platform of interlaced petioles and twigs, situated 2.5 m high in a *Parkinsonia* tree. Clutch consists of 2 white eggs. No further information available.

Movements. Resident.

Status and Conservation. Not globally threatened. Currently considered near-threatened. Very poorly known, but apparently still common to abundant in its highly restricted range. Possible effects of protracted civil war in the zone unknown. Research required.

Bibliography. Anon. (1995j), Ash & Miskell (1983), Ash *et al.* (1974), Britton (1980a), Brown, L.H. (1977), Dowsett & Forbes-Watson (1993), Lewis & Pomeroy (1989), Mackworth-Praed & Grant (1957), Rösler (1996), Short *et al.* (1990), Smith (1965), Snow (1978), Urban *et al.* (1986), Zimmerman *et al.* (1996).

61. African Mourning Dove

Streptopelia decipiens

French: Tourterelle pleureuse **German:** Brillentaube **Spanish:** Tórtola Engañoso
Other common names: Mourning Dove/Collared-dove

Taxonomy. *Turtur decipiens* Hartlaub and Finsch, 1870, Dongala, north Sudan.

Closely related to *S. semitorquata*; also related to *S. decacoto* and *S. roseogrisea*. Includes *S. fulvopectoralis*, known from a single juvenile specimen. Six subspecies recognized.

Subspecies and Distribution.

S. d. shelleyi (Salvadori, 1893) - Mauritania and Senegambia to S Niger and C Nigeria.

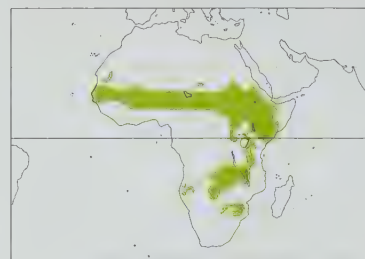
S. d. logonensis (Reichenow, 1921) - L Chad E to S Sudan, NE & E Zaïre and W & N Uganda.

S. d. decipiens (Hartlaub & Finsch, 1870) - Sudan (Darfur), N & C Ethiopia and NW Somalia.

S. d. elegans (Zedlitz, 1913) - S Ethiopia, S Somalia and N & E Kenya.

S. d. perspicillata (Fischer & Reichenow, 1884) - W Kenya and C Tanzania.

S. d. ambigua (Bocage, 1877) - E Angola, SE Zaïre, Zambia and Malawi to R Zambezi and R Limpopo and adjacent lowlands.



Descriptive notes. 28 cm; male 156-230 g, female 140-200 g. Crown and nape ash grey; chin and throat white to greyish; upper foreneck, hindneck and neck sides mauve-pink; face ash grey; hindneck separated from mantle by black half-collar with a white margin; mantle, back, rump, uppertail-coverts, scapulars, tertials and inner wing-coverts brown; some grey on sides of rump; breast vinous grey merging to rosy grey or grey on belly; flanks and undertail-coverts grey, latter white-tipped; middle rectrices brown, outermost grey-brown with broad white tips, basal two-thirds black below and rest white with

grey tinge; three outermost primaries brown with thin white fringes, others grey on basal half and brown distally; iris red or orange-red with yellow inner ring; orbital skin red; bill black; legs wine-red. Sexes alike. Juvenile has crown and nape brown and breast light brown; remiges russet-tipped; iris pale brown. Race *shelleyi* darker, especially above, breast mauve-pink; *logonensis* similarly coloured but has a vinous-grey breast; *perspicillata* similar to nominate but smaller, with belly, undertail-coverts and flanks white, iris pale yellow; *elegans* paler than *perspicillata* with white of underparts extending onto lower breast; *ambigua* like nominate but centre of belly white and undertail-coverts grey with white edging, iris yellow.

Habitat. Thorny *Acacia* and evergreen riparian woods and thickets in arid savanna, within 10 km of a water source; also found in villages and cultivated areas in dense stands of native and exotic trees. Ranges up to 1400 m in parts of E Africa, even up to 2000 m in Ethiopia. Known to roost in hundreds in *Aeschynomene elaphroxylon* trees standing over water in Senegambia.

Food and Feeding. Takes seeds, berries and termites. Total of 49 seed and fruit species identified as food items in Senegambia: in wet years, equal quantities consumed of grasses and cereals including *Panicum laetum* and *Dactyloctenium aegyptium*, as well as dicotyledons like *Tribulus terrestris* and *Gisekia pharnacioides*; in dry years, dicotyledons make up almost entire diet. Food items taken weighed 0.25-892 mg. Generally feeds on ground but will take *Sorghum* seeds directly from standing stalks.

Breeding. Recorded in all months in Senegambia; elsewhere, season varies locally. Nest is a platform of twigs and petioles lined with fine rootlets, 15 cm in diameter; well hidden, mostly in *Acacia nilotica*, *Balanites aegyptiaca* and *A. raddiana*, at average 3-1 m above the ground; some placed in exotic trees up to 5-3 m above ground. Usually 2 eggs, sometimes 1; incubation 13-14 days; fledging 15-18 days.

Movements. Some movement away from rivers detected during the wet season. Daily movements occur between roosting, drinking and foraging localities.

Status and Conservation. Not globally threatened. Generally fairly common to locally abundant throughout extensive range: abundant in Sudan; common to frequent in Kenya, Tanzania and Zambia; uncommon in Malawi. Extent of suitable habitat presumably expanding in some regions due to desiccation. CITES III in Ghana.

Bibliography. Ash & Miskell (1983), Bannerman (1953), Beaman (1994), Benson & Benson (1977), Britton (1980a), Chapin (1939), Dowsett & Forbes-Watson (1993), Elgood *et al.* (1994), Friedmann (1930a), Ginn *et al.* (1989), Giraudeau *et al.* (1988), Gore (1990), Grimes (1987), Irwin (1978), Lamarque (1980), Lewis & Pomeroy (1989), Lippens & Wille (1976), Louette (1981), Mackworth-Praed & Grant (1957, 1962, 1970), Maclean (1993), Morel (1980), Newman (1910a), Nikolaus (1987), Penry (1994), Pinto (1983), Rösler (1996), Rowan (1983), Short *et al.* (1990), Smith (1957), Snow (1978), Urban *et al.* (1986), Zimmerman *et al.* (1996).

62. Red-eyed Dove

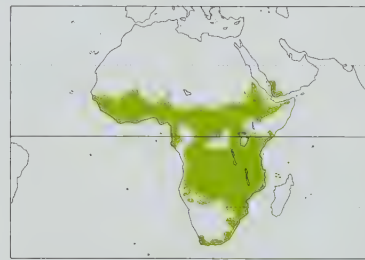
Streptopelia semitorquata

French: Tourterelle à collier **German:** Halbmondtaube **Spanish:** Tórtola Ojirroja
Other common names: Black Dove/Pigeon, Half-collared Dove

Taxonomy. *Columba semitorquata* Rüppell, 1837, Taranta Mountains, Eritrea.

Closely related to *S. decipiens*. Monotypic.

Distribution. Africa S of Sahara and SW Arabia.



Descriptive notes. 30 cm; 162-310 g. Largest of the "ringneck" species. Forehead pale bluish grey merging to a darker hue on crown; neck, breast and underparts dark mauve-pink to wine-red; upperparts greyish brown, primaries black; outer wing-coverts dark slaty blue; flanks, sides of rump and underwing-coverts bluish grey; rectrices dark grey basally, light brownish grey on terminal half; neck with a black half-collar; iris varies from yellowish to orange to red or orange-brown; orbital skin purplish red; bill black; legs purplish red. Sexes alike. Juvenile duller and browner; most of feathers with reddish buff or reddish brown edges and indistinct

dark subterminal bars; neck collar indistinct and restricted to sides of neck; legs, orbital skin and iris dull. Birds from Ethiopian highlands are largest, those from W Africa and coastal Kenya are smallest (in concordance with Bergman's Rule).

Habitat. Dense woodland and *Acacia* thickets close to a source of water; also riparian woodland, gallery forests, forest edge and mangroves; avoids interior of rain forest; visits farms, plantations, parks and garden environments in cities, e.g. Lilongwe. Large trees and availability of water appear to be the two essential features of its habitat.

Food and Feeding. Food items noted include maize, sunflower (*Helianthus*), castor seed (*Ricinus communis*), bullrush millet (*Pennisetum typhoides*), rhizomes of nut grass (*Cyperus esculentus*)

and berries. Termites also relished, and one individual was observed eating a millipede. Most of food taken on the ground, but species has on occasion been seen to pluck berries directly from branches of trees.

Breeding. Patterns vary locally, but recorded in all months in Nigeria, E. Africa, Zimbabwe and South Africa. Nest consists of platforms of twigs, more substantial than those of congeners; placed in tree or bush at height varying from 30 cm to 18 m (average 4 m); in Okavango swamp, nests were found in thickets of *Ficus verruculosa* 1-2 m above water. Usually 2 eggs, but sometimes only 1; incubation averages 14-5 days (possibly up to 17); fledging 14-17 days. In one study, 40% of the nestlings fledged successfully.

Movements. Local movements have been noted in Cameroon, Gambia and Nigeria with the onset of the wet season.

Status and Conservation. Not globally threatened. Little precise information available, but species appears to be frequent to abundant and generally rather common throughout much of extensive range. Has increased in numbers and is more widely distributed as a result of water conservation and tree planting programmes. Abundant in Gambia, Sierra Leone, Togo and Nigeria; more widespread and abundant in S. Africa than in 1930's. CITES III in Ghana.

Bibliography. Akande (1982), Ash & Miskell (1983), Bannerman (1953), Benson & Benson (1977), Britton (1980a), Brooke (1984a, 1984b), Clancey (1976, 1986a), Colston & Curry-Lindahl (1986), Dowsett & Forbes-Watson (1993), Elgood *et al.* (1994), Evans, M.I. (1994), Field (1972), Friedmann (1930a), Gatter & Hodgson (1987), Gibson (1994), Ginn *et al.* (1989), Giraudoux *et al.* (1988), Goodwin (1956a), Gore (1990), Grimes (1971, 1974, 1987), Jackson & Sclater (1938), Jennings (1995), Lamarche (1980), Lever (1987), Lewis & Pomeroy (1989), Lippens & Wille (1976), Louette (1981), Mackworth-Præd & Grant (1957, 1962, 1970), Maclean (1993), Moreau (1944), Newman (1907), Nikolaus (1987), Pakenham (1979), Penry (1994), Pérez del Val (1996), Pinto (1983), Porter *et al.* (1996), Rösler (1996), Rowan (1983), Rutgers & Norris (1970), Short *et al.* (1990), Siegfried (1971), Smithers (1965), Snow (1978), van Someren (1956), Urban *et al.* (1986), Uys (1983), White (1965), Woodall (1971), Zimmerman (1972), Zimmerman *et al.* (1996).

63. Ring-necked Dove

Streptopelia capicola

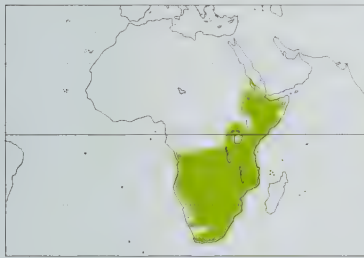
French: Tourterelle du Cap **German:** Gurtaube **Spanish:** Tórtola de El Cabo
Other common names: Cape Turtle-dove, Cape/Dark-eyed Ring-dove, Damara Dove

Taxonomy. *Columba vinacea* var. *capicola* [sic] Sundevall, 1857, Rondebosch, Cape Province.

Forms a superspecies with *S. vinacea*. Six subspecies recognized.

Subspecies and Distribution.

S. c. electa (Madarász, 1913) - W Ethiopia.
S. c. somalica (Erlanger, 1905) - E Ethiopia, Somalia and N Kenya S to Uaso Nyiro R.
S. c. tropica (Reichenow, 1902) - C Kenya to Angola, Zimbabwe and South Africa.
S. c. onguati Macdonald, 1957 - SW Angola and N Namibia.
S. c. damarensis (Hartlaub & Finsch, 1870) - Namibia, Botswana and SW Zimbabwe.
S. c. capicola (Sundevall, 1857) - W Cape Province, South Africa.



pale fringes; underwing dark bluish grey; iris dark brown; orbital skin yellow; bill black to purplish black; legs reddish purple or greyish purple. Female has rump drab brown, areas grey in male suffused with dull brown. Juvenile has neck collar reduced to a small patch on each side of neck and most feathers edged with fawn or buff. Race *tropica* paler but neck and breast more strongly tinged with mauve-pink, face has little or no grey suffusion and grey crown washed with pink; *damarensis* paler and greyer, especially on wing-coverts and rump, belly whiter, female slightly browner; *onguati* slightly paler than *damarensis*; *somalica* like *tropica* but smaller and paler; *electa* like *tropica* but darker, greyer on face and belly.

Habitat. Thrives in woodland and open wooded savanna; also frequents plantations and farmland, and regularly found around villages. Avoids forest.

Food and Feeding. Essentially a seed-eater but also takes a variety of invertebrates including aphids, locust nymphs, earthworms, termites and weevils; rhizomes of nut grass, fruits of *Rhus*, *Lantana* and *Pyreanthus* as well as nectar from *Aloe marlothii*, green stems of introduced *Acacia cyclops* and fleshy leaves of Aizoaceae also consumed. Most of food taken on the ground, but birds often perch on *Sorghum* to extract seeds.

Breeding. Season varies locally, but breeding has been recorded in all months in Zimbabwe and South Africa. Pairs occupy breeding territories of c. 0.5 ha; nests are often spaced c. 25 m apart. Nest is a frail twig structure c. 13 cm in diameter, sometimes lined with other material, and well hidden in foliage; old nests may be reused and new materials added so that nest may become 7-15 cm deep; placed 0.5-15 m above ground in tree or bush. Usually 2 eggs, sometimes 1 and rarely 3-4; incubation 13-15 days; fledging 16-17 days. Of 333 young followed in one study, 71% fledged successfully.

Movements. Ringing studies indicate that most individuals are sedentary; however, from about Sept to late Jan numbers decrease or birds disappear altogether in various parts of Zambia; about May-Jul or Aug large flocks appear again. Large groups are seen at low elevations in Zululand in winter.

Status and Conservation. Not globally threatened. Abundant throughout much of sizeable range; call is one of commonest and most typical sounds of African savanna. Species probably increasing its range as a result of deforestation and increase of cultivated land.

Bibliography. Ash & Miskell (1983), Benson (1960), Benson & Benson (1977), Britton (1980a), Clancey (1957, 1989b), Curry-Lindahl (1980), Dowsett & Forbes-Watson (1993), Friedmann (1930a), Ginn *et al.* (1989), Heyl (1982), Knight (1989), Lewis & Pomeroy (1989), Lippens & Wille (1976), Mackworth-Præd & Grant (1957, 1962, 1970), Maclean (1993), Myburgh & Broekhuysen (1974), Nikolaus (1987), Pakenham (1979), Penry (1994), Pinto (1983), Rösler (1996), Rowan (1983), Short *et al.* (1990), Siegfried (1971, 1984), Smithers (1959), Snow (1978), Urban *et al.* (1986), Vincent, A.W. (1946), Vincent, J. (1934), White (1945), Zimmerman *et al.* (1996).

64. Vinaceous Dove

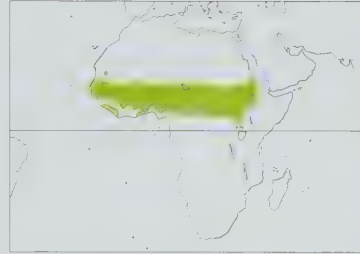
Streptopelia vinacea

French: Tourterelle vineuse **German:** Röteltaube **Spanish:** Tórtola Vinosa
Other common names: Vinaceous Ring-dove/Turtle-dove

Taxonomy. *Columba vinacea* J. F. Gmelin, 1789, Senegal.

Forms a superspecies with *S. capicola*. Monotypic.

Distribution. Mauritania, Senegambia and Guinea E to Eritrea, C Ethiopia and Uganda.



brown; bill black, gape purplish; legs purple or purplish red. Female similar but pinkish areas are often more brownish. Juvenile duller, most feathers with pale buff or pale rufous edgings; neck collar present as a patch on each side of neck.

Habitat. Occupies dry woodland from sea-level up to 2000 m; also found in bushy grassland and cultivated areas. In N Sierra Leone, arrives to breed in savanna woodland and *Lophura* belt. Unlike several congeners, does not adapt well to suburban areas and gardens.

Food and Feeding. Seeds and other vegetable matter make up most of diet, but termites, caterpillars and snails also taken. A study in Senegambia catalogued seeds and fruit of 88 species in the diet; in wet years, 80% of diet made up of grass seeds, notably *Panicum laetum* and *Brachiaria*; in dry years, mostly legumes, including *Zornia* and *Alysicarpus*. Foraging occurs on open ground, in pairs or small groups; sometimes forms large flocks.

Breeding. Recorded in all months in Senegambia and Mali; Mar in Ethiopia, and Aug-Sept in rest of E Africa. Pairs defend breeding territories. Nest is frail, thin platform placed on average c. 2-5 m above ground; trees used include *Balanites*, *Acacia raddiana*, *Sclerocarya*, *Commiphora* and 13 other species. Lays 2 white eggs; in captivity, incubation 14 days, the young hatching one day apart, and fledging 13-14 days.

Movements. Seasonal movements recorded between bush savanna and riparian habitat, but precise details not clear. Movements involving up to 300,000 birds have been observed in Sahelian Mali and inundation zone of R Niger between Jan and Apr, suggesting either seasonal dispersal or migration N in rainy season. In Sierra Leone, present only in dry season Sept-Jun, when breeds. Daily trips are made between roosting and foraging and drinking places.

Status and Conservation. Not globally threatened. Generally abundant, e.g. in Gambia, N Sierra Leone and N Togo. Populations expanding in places, e.g. in Senegambia, appears to be on the increase due to proliferation of sugar cane plantations. In Nigeria, abundant in Guinea Savanna, but less common in Sahel and Sudan zones. CITES III in Ghana.

Bibliography. Bannerman (1953), Britton (1980a), Chapin (1939), Cheesman & Sclater (1935), Dowsett & Forbes-Watson (1993), Elgood *et al.* (1994), Giraudoux *et al.* (1988), Gore (1990), Grimes (1987), Harman (1963), Lamarche (1980, 1988), Lippens & Wille (1976), Louette (1981), Mackworth-Præd & Grant (1957, 1970), Morel, G.J. & Morel (1972, 1990), Morel, M.Y. (1980), Nikolaus (1987), Rutgers & Norris (1970), Serle (1939, 1957), Short *et al.* (1990), Smith (1957), Snow (1978), Urban *et al.* (1986).

65. Red Turtle-dove

Streptopelia tranquebarica

French: Tourterelle à tête grise **German:** Zwerglachtaube **Spanish:** Tórtola Cabecigrís
Other common names: Red Ring-dove, Red-collared Dove, Dwarf Turtle-dove

Taxonomy. *Columba tranquebarica* Hermann, 1804, Tranquebaria, India.

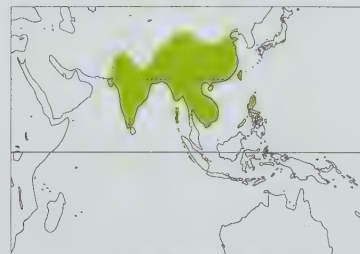
A very distinctive species, distantly related to the *S. roseogrisea* group. Two subspecies recognized.

Subspecies and Distribution.

S. t. tranquebarica (Hermann, 1804) - Sind and Punjab E to W Nepal, Bihar and Bengal, and S through peninsular India.

S. t. humilis (Temminck, 1824) - NE Tibet, Nepal, Sikkim and Assam through Myanmar, Andaman Is, Thailand and Indochina to N China, Taiwan and N Philippines.

Also Sulawesi, where presumed to have been introduced.



edgings; primaries black; underside of tail black on basal half and white distally; iris ranges from brown to brownish black; orbital skin greyish; bill black to greyish black; legs purplish black or purplish red. Female quite different: drab brown where male is vinous pink and brownish grey where he is bluish grey. Juvenile female is a paler version of adult, most feathers edged with buff; juvenile male resembles juvenile female but plumage is suffused with a reddish tint. Race *humilis* darker all over.

Habitat. Inhabits open country with trees, scrub, jungle and dry woodland. Unlike its Asian congeners, it is seldom found close to human activity. Summer visitor to Himalayas below 800 m; ascends to 1300 m in Bengal and Assam; elsewhere it is mostly a bird of lowlands.

Food and Feeding. Feeds on seeds of grasses and herbs, as well as cultivated seeds, including rice and maize, buds and young leaves. Most if not all food taken from the ground. Usually occurs in twos or threes but may gather in flocks of 50 or more at good food sources.

Breeding. S populations breed when food is available; N populations await the favourable conditions of summer. Nest is a skimpy saucer or platform of twigs and grass stems, usually placed 3-7/8 m up a tree (higher than in congeners), often near the extremity of a leafy branch. Lays 2 white or creamy white eggs, rarely 3.

Movements. N populations migratory, most birds moving to S Asia for winter. In Pakistan, present only in summer to breed, arriving from India. In Hong Kong, known only as migrant. Vagrant to Masirah I. S. Arabia.

Status and Conservation. Not globally threatened. Common to relatively abundant in some areas. Abundant in Pakistan, mainly in Punjab; not uncommon in Andaman Is; very common in Thailand; fairly common in Philippines. Common in C Sulawesi, where species presumed to be introduced, perhaps from nearby Philippines, or brought by people immigrating from India in about 1930.

Bibliography. Ali (1996), Ali & Ripley (1981), Allen (1920), Andrew & Holmes (1990), Baker (1913), Brancato (1994), Brazil (1991), Coates & Bishop (1997), Deignan (1945), Dickinson *et al.* (1991), Étchécopar & Hüe (1978), Herklots (1953), Hüe & Étchécopar (1970), Lekagul & Round (1991), Lever (1987), Majumdar *et al.* (1992), Mukherjee (1995), Phillips (1978), Pitman (1915), Ripley (1982), Roberts, T.J. (1991), Robson (1996b), Rutgers & Norris (1970), Singh (1958), Smythies (1986), Stepanyan (1990a), White & Bruce (1986), Yang Lan *et al.* (1995).

66. Madagascar Turtle-dove

Streptopelia picturata

French: Pigeon de Madagascar **German:** Madagaskarturtaube **Spanish:** Tórtola Malgache
Other common names: Painted Dove, Red Turtle-dove(!)

Taxonomy. *Columba Picturata* Temminck, 1813, Mauritius.

A very distinct member of the genus, more heavily built than congeners, with longer legs; sometimes placed in genus *Columba*, where linked with *C. delegorguei*; has been claimed to have affinities with *S. turtur* and allies. Internal taxonomy confused: in past, birds from Aldabra erroneously placed in race *aldabrana* (origin of type specimen presumably mistaken), with those of Amirantes awarded race *saturata*; birds of Assumption I were awarded a separate race, *assumptionis*; birds of Chagos Is formerly awarded race *chuni*, but now identified as hybrids *picturata* x *comorensis*, possibly introduced from ships. Five subspecies currently recognized.

Subspecies and Distribution.

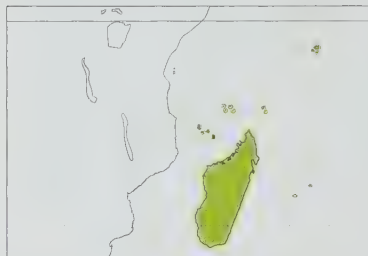
S. p. rostrata (Bonaparte, 1855) - Seychelles, on Praslin, Aride, Mahé, Cousin, Cousine and Bird I.
S. p. aldabrana (P. L. Sclater, 1872) - Amirantes Is.

S. p. copperingi (Sharpe, 1884) - Aldabra, South I (Cosmoledo Atoll) and Glorieuses Is (N of Madagascar); formerly also on Cosmoledo I, Astove and Assumption.

S. p. comorensis (E. Newton, 1877) - Comoros Is.

S. p. picturata (Temminck, 1813) - Madagascar.

Introduced (*picturata*) to Seychelles, Amirantes, Reunion and Mauritius; also (hybrids) to Diego Garcia I in Chagos Archipelago.



Descriptive notes. 28 cm; 146-188 g. Head bluish grey; sides and back of neck slightly iridescent mauve-pink or greenish mauve-tipped feathers with black bases, these feathers slightly bifurcated; rest of neck and breast dark pinkish purple merging into darker reddish purple on mantle and wing-coverts; ventral regions greyish to buffish white; greater wing-coverts dark brown with a purplish red wash; secondaries and primaries dark brown, each feather with a narrow reddish buff fringe; rump and uppertail-coverts dark bluish grey, sometimes with some brown intermixed; central rectrices dark greyish brown, lateral ones

greyish black with broad white terminal band; iris brown with red outer ring; orbital skin purplish red; bill purplish basally, bright bluish grey distally; legs reddish. Female duller, purplish red on coverts less extensive and terminal band on rectrices a darker grey. Juvenile dull greyish brown throughout, most of breast feathers and those of upperparts with chestnut or rufous-buff edging. Race *comorensis* browner throughout and has brownish purple replacing grey on head of nominate; birds on Grand Comoro have pale red to reddish brown eyes, on other islands eyes yellow with a purplish red outer ring; *rostrata* darker than *comorensis* with dark grey lower breast and flanks, and white undertail-coverts; *aldabrana* resembles *comorensis* but paler throughout with less reddish purple on wing-coverts, and undertail-coverts grey.

Habitat. Mainly forest but also occurs in degraded woodland, cropland and woodland near human habitation. In Madagascar, occurs from sea-level up to 2000 m.

Food and Feeding. Diet consists mostly of seeds, but species also takes fallen fruit and some invertebrates; feeds on seeds of *Castor* and *Ricinus* in Seychelles; also on coconut meat on copra driers. Forages mostly on the ground in woods, in areas free of dense cover; also seen along trails and forest breaks.

Breeding. Nesting Jul-Feb in Madagascar; Oct-Nov in Comoros. Nest is a flat structure consisting of interlaced twigs, situated 1.5-5 m above the ground in a tree fork or bush; often placed in *Casuarina* trees in Seychelles; in Aldabra, sometimes nests in mangroves. Lays 2 white eggs.

Movements. Sedentary.

Status and Conservation. Not globally threatened. Common throughout Madagascar, except on central High Plateau; hunted locally, and sometimes kept in captivity. On a local level some insular races are seriously threatened or have been eliminated. The introduction of the nominate race from Madagascar is causing or has caused the swamping out of genes of race *rostrata* in Seychelles; in a study published in 1984, both pure *rostrata* and hybrid *rostrata* x *picturata* were found on predator-free islands of Cousin and Cousine, but by 1995, few birds showed characteristics of *rostrata*; fortunately, on tiny Bird I, 80 km from nearest large island, birds of apparently pure *rostrata* type survive, and are flourishing in dense woodland which has grown up in centre of island. Race *copperingi* now extinct on Assumption, but still occurs in Aldabra; was also thought to be extinct in Cosmoledo Is (NE of Aldabra), with no records since 1908, but quite recently rediscovered on South I, occupying an area of c. 1000 m² in W of island. Small numbers of race *aldabrana* survived at least until 1974 in Amirantes, but again were being swamped out by introduced nominate. Still common throughout Comoros; lower numbers detected in 1989 than in 1985, but difference attributed to weather and possibly to timing.

Bibliography. Benson (1960, 1967, 1970), Benson & Penny (1971), Benson, Beamish *et al.* (1975), Benson, Colebrook-Robjent & Williams (1976-1977), Bertioz (1948), Cheke (1987), Dee (1986), Diamond, A.W. (1985a, 1985b), Dowsett & Dowsett-Lemaire (1993), Dowsett & Forbes-Watson (1993), Feare & Gill (1995), Greenway,

J.C. (1967), Hutson (1975), King (1978/79), Langrand (1990), Lever (1987), Louette (1988, 1992), Louette & Stevens (1992), Louette *et al.* (1988), Milon (1951), Milon *et al.* (1973), Mortimer (1984), Newman (1908), Penny (1974), Rand (1936), Skerrett (1996), van Someren (1947), Stevens, Herremans & Louette (1992), Stevens, Louette *et al.* (1995), Young, G. (1995).

67. Spotted Dove

Streptopelia chinensis

French: Tourterelle tigrine **German:** Perlhalstaube **Spanish:** Tórtola Moteada
Other common names: Laceneck/Necklace/Spot-necked/Spotted-necked Dove, Indian/Chinese Turtle-dove, Pearl-necked Dove

Taxonomy. *Columba chinensis* Scopoli, 1786, Canton, China.

Distinct from all other members of genus; closest relative has been claimed to be *S. senegalensis*. Race *suratensis* has been considered sufficiently distinct for potential recognition as a separate species. Many more races have been described. Three subspecies currently recognized.

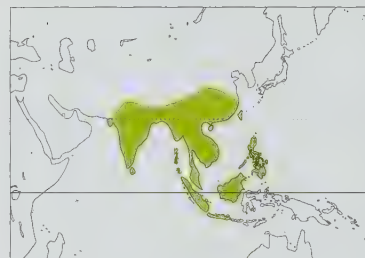
Subspecies and Distribution.

S. c. suratensis (J. F. Gmelin, 1789) - Pakistan, Nepal and India S to Sri Lanka, and E to Bhutan and Assam.

S. c. chinensis (Scopoli, 1786) - Myanmar to C & E China (Sichuan, W Yunnan and Hainan N & E to Hebei) and Taiwan.

S. c. tigrina (Temminck, 1810) - Bangladesh, extreme NE India, Myanmar and Thailand through Indochina, Philippines and Greater and Lesser Sundas to Timor.

Introduced to Sulawesi, Moluccas, Mauritius, Australia, New Zealand, Hawaii and continental USA.



Descriptive notes. 27.5-30 cm; 128 g. Forehead, crown and face light grey with hints of pink; chin white to pale grey; nape, sides of upper neck, throat and breast vinaceous pink merging into buff and grey on lower belly; a narrow black line extends from gape to eye; a patch of feathers on sides and back of neck consists of bifurcated feathers, each one black basally and white at tip; towards back feathers show hints of pink; back, most of wings, rump, uppertail-coverts and central rectrices dull brown with pale rufescent edgings on most feathers; outermost wing-coverts blue-grey forming a patch on wing-edge; underwing

coverts blue-grey; outer rectrices black with broad white tips; iris orange, orange-brown or pinkish; orbital skin mauve or purplish red; bill dark brown to black; legs red or purplish. Sexes alike. Juvenile lacks spotted neck-patch, this area being dark grey; nape and crown have a brownish wash; mantle and back grey-brown, feathers on latter have ochre tips; scapulars rich brown with ochre tips; primaries and secondaries brown with buff tips; iris grey yellow; bill grey-horn basally, black distally; legs flesh-pink. Race *suratensis* paler on head and breast than nominate and *tigrina*, and mauve-pink wash on belly, with undertail-coverts white and wing-coverts decked with black and buffish pink spots, patch on forepart of wing more extensive and paler; race *tigrina* differs from nominate in having lighter grey feathers on leading edge of wings, white or off white undertail-coverts, and wing-coverts streaked with black.

Habitat. Prefers more mesophytic situations than *S. senegalensis*; thus frequents moist deciduous jungles and avoids arid areas; also commonly found near humans in cultivated areas, gardens with trees and groves; in Sri Lanka occupies dry jungle as well as cultivated areas. Himalayan populations typically occur up to 2400 m in summer, though a straggler was found at 4900 m. Introduced Australian populations tend to occur near humans, but also inhabit scrub growth in riparian situations; abundant in river valleys but avoids eucalyptus woods and rain forest.

Food and Feeding. Poorly known. Feeds on seeds of grasses and herbs, as well as grain. Food is taken on the ground; usually seen in pairs or groups of 5-6 birds, although large groups may congregate at good food sources.

Breeding. Known to breed all year round in many parts of its range. Nest is typically a flimsy structure, consisting of twigs and grass stems; often placed low in a tree, thorn-bush or bamboo clump; in India, some birds nest in eaves, rafters and cornices of abandoned bungalows. Typically 2 white eggs, rarely 3; incubation 14-16 days; fledging 15 days.

Movements. Himalayan populations move to lower altitudes in winter; some nomadic movements also take place locally. A ringing study conducted in Australia (where introduced) revealed that most individuals remained near the ringing station, some wandered 2-5 km away and one was found 45 km away.

Status and Conservation. Not globally threatened. Generally very common to abundant and often very abundant. A successful species thriving in disturbed moist habitat, often as a commensal with man; at present is still expanding its already huge range, much helped by introductions; in Philippines, it is displacing *S. bitorquata*.

Bibliography. Ali (1996), Ali & Ripley (1981), Ara (1958), Baker (1913), Baptista (1976), Chambers (1989), Cheng Tsohsin (1963), Coates & Bishop (1997), Deignan (1945), Dickinson *et al.* (1991), Étchécopar & Hüe (1978), Frith (1982), Frith & McKean (1975), Frith, McKean & Braithwaite (1976), Hellebrekers & Hoogerwerf (1967), Higgins & Davies (1996), Hüe & Étchécopar (1970), Inskipp & Inskipp (1991), Kumar (1981), Lekagul & Round (1991), Lever (1987), Li Binghua & Chen Bihui (1978), MacKinnon & Phillips (1993), Madoc (1976), Majumdar *et al.* (1992), van Marle & Voous (1988), Medway & Wells (1976), Pang Bingzhang (1980, 1983), Paton & Paton (1987), Phillips (1978), Price *et al.* (1995), Ripley (1982), Roberts, T.J. (1991), Robertson (1985), Root (1988), Rutgers & Norris (1970), Satheesan *et al.* (1990), Small (1994), Smythies (1981, 1986), Stepanyan (1995), Waldbauer & Waldbauer (1982), White & Bruce (1986), Yang Lan *et al.* (1995).

68. Laughing Dove

Streptopelia senegalensis

French: Tourterelle maillée **German:** Palmtaube **Spanish:** Tórtola Senegalesa
Other common names: Palm/Senegal Dove, Indian Little Brown Dove

Taxonomy. *Columba senegalensis* Linnaeus, 1766, Senegal.

Differs distinctly in plumage and vocalizations from all congeners; possibly related to *S. chinensis*. Birds of São Tomé and Príncipe (Gulf of Guinea) sometimes awarded separate race *thome*, but validity very doubtful, particularly as species may be introduced here. Five subspecies recognized.

Subspecies and Distribution.

S. s. phoenicophila Hartert, 1916 - oases S of Atlas Mts in Morocco, Algeria and Tunisia.

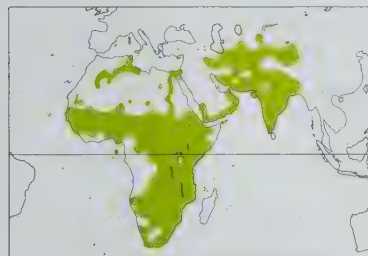
S. s. aegyptiaca (Latham, 1790) - Nile Valley, from Suez Canal and delta S to Wadi Halfa.

S. s. sokotrae C. H. B. Grant, 1914 - Socotra.

S. s. senegalensis (Linnaeus, 1766) - sub-Saharan Africa and W Arabia from Medina (Saudi Arabia) S to Aden and Mukalla (S Yemen).

S. s. cambayensis (J. F. Gmelin, 1789) - E Arabia and E Iran N & E to Kazakhstan and W Xinjiang (NW China), and E to Pakistan, India and Bangladesh.

Introduced to Australia; also occurs (probably introduced) in Israel, Syria, Lebanon, Turkey and Malta.



Descriptive notes. 27 cm; 71-92 g. Head, neck and breast mauve-pink, merging into creamy white belly which passes into white undertail-coverts; a broad band of bifurcated display feathers on front and sides of neck, each feather black basally with golden copper tips; mantle, scapulars and inner wing-coverts rusty red-brown; outer wing-coverts blue-grey to slate; secondaries a darker greyish slate; primaries dark grey-brown edged white to buff; lower back and rump dark slate-blue with brown admixed; uppertail-coverts dark greyish brown with reddish tips; central 4 rectrices greyish brown, outer ones grey-brown with broad white

tips, more extensive than in *S. chinensis*; iris dark brown; bill dark grey-brown; legs purple-pink. Female similar but usually duller, back less red-brown, breast less pinkish; eye-ring often grey with a pink edge; legs dull red. Juvenile lacks coppery neck plumage of adult; rusty brown areas replaced by dull brown, pinkish areas by tawny grey; lower breast and belly pale brown rather than whitish; most body feathers have pale fringes; bill dark grey, iris light brown and legs red-pink. Race *aegyptiaca* slightly larger, darker and redder; *phoenicophila* tends to be larger and duller than nominate; *sokotrae* smaller, with a brighter pink head; *cambayensis* very distinct, smaller and duller than nominate, lacks rusty hue and has reduced amount of blue-grey on rump.

Habitat. In Africa, occupies dry habitat but tends to stay within 10 km of water; generally found in wooded savanna, villages and urban gardens, but commonest in acacia woodland; in Freetown (Sierra Leone), species has assumed the role of city pigeon (*Columba livia* absent), feeding in docks, roosting on roofs, and probably breeding in gardens and cemeteries. Indian populations occupy dry deciduous biotope and margins of semi-desert. Introduced populations in SW Western Australia thrive near towns; although available natural habitat in Western Australia superficially resembles that in native range of species in Africa, such habitat has not been colonized.

Food and Feeding. Seeds less than 2 mm in length comprise most of diet, but species also takes entire sunflower seeds or grains of maize; also eats fruits and nectar from *Aloe*; some insects are

taken including ants, termites, fly larvae and pupae. Monocotyledons comprise 70-80% of diet in years of good rainfall. Seed items identified include those of oats, wheat, millet, sorghum, *Croton*, *Celosia*, *Amaranthus*, *Oxalis*, *Rhus*, *Polygala*, *Acacia* and various legumes. Food is taken on the ground, the birds foraging close to shrubs; rarely plucks fruit or grain directly from plants. Generally solitary or in pairs or in flocks of 3-4, but hundreds may gather near water.

Breeding. Feb-Jun in N Africa, but Feb-Oct in Egypt; recorded in all months in Senegambia, Zimbabwe and South Africa, but in E Africa just after rains and into dry season; in India, mainly Jan-Oct, but probably all year. Pair occupies breeding territory averaging c. 0.19 ha; in one case, four nests were found 3 m apart in same tree. Nest is a frail, thin platform of roots, twigs and petioles, 8-14 cm in diameter and 3-4 cm deep; placed in bush or tree up to 15 m above the ground (average 2.3 m); same nest may be used more than once, and some doves use old nests of bulbuls or thrushes; 19 species of trees have been recorded as sites, including *Acacia raddiana*, *Balanites aegyptiaca* and *Zizyphus mauritiaca*; Indian populations sometimes breed on cornices or rafters of uninhabited dwellings. In one study 582 clutches contained 2 eggs, 28 had 1 egg, 8 had 3 eggs, and 1 had 4 eggs (probably from 2 females); incubation 12-13 days; fledging 12-13 days. In one study 75.5% of 340 chicks examined fledged successfully.

Movements. Partially migratory in parts of Africa, and in places seasonal movements have been documented. Indian populations are also partially migratory; one bird ringed near Bhuj in Kachchh was recovered c. 200 km away near Hyderabad (E Pakistan). Also, 4-5 birds on migration landed aboard a ship, 16 km off Karachi on a foggy morning.

Status and Conservation. Not globally threatened. Widespread and common to abundant in many parts of huge natural range; generally one of most widespread doves within this range, though tends not to be the most numerous. Equally abundant in many parts of introduced range. CITES III in Ghana.

Bibliography. Ajith & Ramachandran (1990), Al-Dabbagh *et al.* (1992), Ali (1996), Ali & Ripley (1981), Ash & Miskell (1983), Aspinall (1996a), Bannerman (1953), Barreau & Rocher (1990), Benson & Benson (1977), Benvenuti *et al.* (1991), Biricik *et al.* (1989), Britton (1980a), Clancey (1986b), Cole (1982), Cramp (1985), Dean (1977, 1979a, 1979b, 1980, 1983), Dowsett & Forbes-Watson (1993), Elgood *et al.* (1994), Étchécopar & Hùe (1964, 1978), Evans, M.I. (1994), Flint *et al.* (1984), Friedmann (1930a), Frith (1982), Frith, McKean & Braithwaite (1976), Gavrilov (1983), Gibson (1994), Ginn *et al.* (1989), Giraudoux *et al.* (1988), Goodman *et al.* (1989), Gore (1990), Grimes (1987), Heyl (1982), Higgins & Davies (1996), Hùe & Étchécopar (1970), Hunter (1973), Jennings (1995), Kasperek (1991), Kekilova (1973), Kemp (1993), Knystautas (1993), Kumar & Ramachandran (1990), Lever (1987), Lewis & Pomeroy (1989), Lippens & Wille (1976), Louette (1981), Mackworth-Praed & Grant (1957, 1962, 1970), Maclean (1993), Morel (1980), Mukherjee (1995), de Naurois (1994), Nikolaus (1987), Parker, V. (1982), Paz (1987), Penry (1994), Pilcher (1994), Pinto (1983), Plath (1987), Porter *et al.* (1996), Rana (1976), Roberts, T.J. (1991), Rowan (1983), Rutgers & Norris (1970), Sahin *et al.* (1987), Satheesan *et al.* (1990), Scott (1986), Shirihai (1996), Short *et al.* (1990), Siegfried (1971), Singh (1958), Snow (1978), Sodeinde (1993), Stepanyan (1990a), Steyn *et al.* (1986), de Swardt (1993), Ticehurst (1923), Urban *et al.* (1986), Walsh (1980), White (1949), Yahya (1995), van Zijl (1994), Zimmerman *et al.* (1996).



ssp unchall

ssp amboinensis

ssp albicapilla

69

ssp tusalia

70

ssp doreya

ssp carteretia

71

72

ssp magna

ssp macassariensis

73

74

75

ssp borneensis

75

ssp emiliana

76

ssp cinnamomea

77

rufous morph

grey morph

ssp griseotincta

79

ssp reinwardtii

80

81

ssp orientalis

ssp nana

78

82

83

PLATE 8

inches 7
cm 18

Genus *MACROPYGIA* Swainson, 1837

69. Barred Cuckoo-dove

Macropygia unchall

French: Phasianelle onchall **German:** Bindenschwanztaube **Spanish:** Tórtola-cuco Unchal
Other common names: Bar-tailed/Long-tailed/Large/Larger Indian/Larger Malay Cuckoo-dove

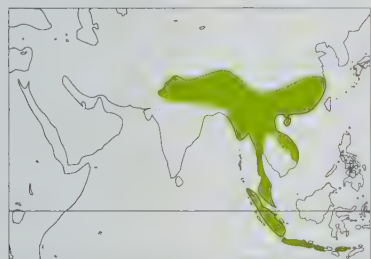
Taxonomy. *Columba Unchall* Wagler, 1827, no locality. Three subspecies recognized.

Subspecies and Distribution.

M. u. tusalia (Blyth, 1843) - Himalayas from Kashmir and Garhwal E to Assam, Sichuan and SW Yunnan, and S in hills of Myanmar to Shan States.

M. u. minor Swinhoe, 1870 - mountains of SE China (Fujian, Guangdong, Hainan) S to C Vietnam (Annam), Laos and N Thailand.

M. u. unchall (Wagler, 1827) - montane areas of Malay Peninsula, through Sumatra and Java to Bali, Lombok and Flores.



Descriptive notes. 37-41 cm; 153-182 g. Fore-head and throat buff merging into pinkish grey crown, ear-coverts and nape; green or purplish pink iridescence on hindneck; sides of breast and neck mauve pink with fine black bars and some green iridescence; rest of underparts pinkish grey merging to buff on belly and undertail-coverts; flanks dusky; back, wings and central rectrices barred black and chestnut; outer rectrices blue-grey with broad black subterminal band, whitish on basal half of outer webs of outermost pair; iris with inner pale blue or sometimes brown ring, surrounded by pink outer ring; orbital skin bluish grey, eyelids purple;

bill dark grey, feet and legs dull cherry red or purplish brown. Female reddish brown on head and breast merging to buff on face and belly, with fine black bars evident throughout; hindneck with some green iridescence; basal portion of inner webs of outer rectrices chestnut. Juvenile similar to female, but young male slightly darker and redder. Race *tusalia* slightly larger and darker than nominate, with pink tinge on head and breast richer; *minor* smaller.

Habitat. Inhabits dense evergreen forest and secondary jungle at 450-2750 m in Himalayas. In Sumatra, Java and Bali, occurs in sub-montane forests and occasionally gardens and coconut plantations at 800-3000 m. Observed in pairs or groups of up to 10 individuals.

Food and Feeding. Seeds, grain, buds, shoots, acorns, berries and small drupes constitute its diet. Occasionally feeds on the ground in open glades in forest, but more usually in trees where it is very acrobatic, like fruit-doves; may hang upside-down from a tree and swing out towards a berry, otherwise just out of reach.

Breeding. In India and Nepal, breeds at least Mar-Jul; nests found Dec-Mar in Malaysia; no data on seasonality from Greater or Lesser Sundas. Nest is large, flimsy platform of twigs, placed 2-8 m up in a sapling or stunted oak. Lays 1, occasionally 2, slightly glossy white or cream-coloured eggs, occasionally with a very small number of olive-yellow speckles and spots; incubation 15-16 days; fledging 19 days.

Movements. Sedentary and resident throughout most of range, but Himalayan birds may move down to adjacent plains in winter. Vagrant to Hong Kong and to Shanghai region of E China.

Status and Conservation. Not globally threatened. Considered common in S Vietnam and Thailand. Occurs throughout Sumatra, Java and Bali where said to be common, although less so than *M. ruficeps*; only two records on Flores. Scarce in Nepal.

Bibliography. Ali (1996), Ali & Ripley (1981), Baker (1913), Bishop (1992), Coates & Bishop (1997), Deignan (1945), Éichéopar & Hùe (1978), Hellebrekers & Hoogerwerf (1967), Hume (1890), Inskipp & Inskipp (1991), Lekagul & Round (1991), MacKinnon & Philipps (1993), Madoc (1976), Majumdar *et al.* (1992), van Marle & Voous (1988), McClure (1964), Medway & Wells (1976), Ripley (1982), Robinson (1928), Rösler (1996), Smythies (1986), Stepanyan (1995), White & Bruce (1986), Yang Lan *et al.* (1995).

70. Slender-billed Cuckoo-dove

Macropygia amboinensis

French: Phasianelle d'Amboine **German:** Kuckuckstaube **Spanish:** Tórtola-cuco Pechirroza
Other common names: Amboina/Pink-breasted/Brown(!) Cuckoo-dove

Taxonomy. *Columba amboinensis* Linnaeus, 1766, Ambon.

May form superspecies with *M. phasianella*, *M. magna*, *M. rufipennis*, *M. tenuirostris* and *M. emiliana*, and all six sometimes considered conspecific; various other combinations proposed, with *M. phasianella* and *M. magna* normally considered to be the forms closest to present species; further studies are required in order to clarify precise relationships within this complex. Validity of some races, notably *kerstingi*, has been questioned; delimitation of subspecific ranges also unclear in several cases. Fifteen subspecies recognized.

Subspecies and Distribution.

M. a. sanghirensis Salvadori, 1878 - Talaud Is and Sangihe Is (Sangihe, Siau, Tahulandang, Ruang).

M. a. albigapilla Bonaparte, 1854 - Sulawesi and islands off NE (Manadotua, Manterawu, Bangka, Lembeh) and SE (Muna, Butung, Tukangbesi Is), Banggai Is (Peleng) and Sula Is.

M. a. batchianensis Wallace, 1865 - N Moluccas, on Morotai, Halmehera, Bacan, Obi, Kasiruta, Kayoa and Ternate.

M. a. amboinensis (Linnaeus, 1766) - S Moluccas, on Buru, Seram, Ambon and Seram Laut.

M. a. keyensis Salvadori, 1876 - Kai Is (SE Moluccas).

M. a. doreya Bonaparte, 1854 - W Papuan Is (Waigeo, Misool, Kofiao, Salawati, Batanta) and NW New Guinea E to Geelvink Bay.

M. a. majorensis Salvadori, 1878 - Numfor I (Geelvink Bay).

M. a. griseinucha Salvadori, 1876 - Mios Num I (Geelvink Bay).

M. a. kerstingi Reichenow, 1897 - Yapen I (Geelvink Bay) and N coast of New Guinea from Memberano to Astrolobe Bay.

M. a. goldiei Salvadori, 1893 - S coast of SE New Guinea from Merauke region to Milne Bay.

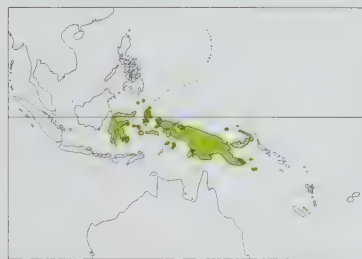
M. a. meeki Rothschild & Hartert, 1915 - Manam I, off NE New Guinea.

M. a. carteretia Bonaparte, 1854 - Bismarck Archipelago (except New Hanover) and Lihir Is.

M. a. hoeskeri Neumann, 1922 - New Hanover.

M. a. cinereiceps Tristram, 1889 - D'Entrecasteaux Is.

M. a. cunctata Hartert, 1899 - Louisiade Archipelago.



Descriptive notes. 34-37 cm; 107-179 g. Fore-head and face dark orange-brown becoming reddish brown on crown; upperparts mostly reddish brown, darkest on wing-coverts which are blackish with reddish tips; primaries and secondaries brownish black, outer webs with narrow rusty or tawny edges; sides and back of neck, and mantle rusty brown with fine blackish flecks; neck feathers with silvery green or silvery pink fringes; throat pale brown; breast golden brown suffused pink; narrow black bars and brownish pink tips to feathers giving breast mottled effect; belly and undertail-coverts chestnut; central rectrices dark reddish brown; shorter outer rectrices chestnut with black subterminal band; iris grey or blue with an outer ring of red, orange or yellow; bill brown or black; feet red to purple. Female more heavily barred and redder above; iridescence of neck feathers absent; forehead and crown red-brown, speckled black; wing-coverts blackish with broad rust or red-brown fringes; hindneck and upper mantle red-brown with fine dark vermiculations; pale streak beneath the eye, absent in male. Juvenile similar to female but mantle feathers with black subterminal bars and rusty fringes. Underparts redder and more closely barred than adults. Race differ mainly in coloration and also in extent of barring: *kerstingi* less strongly barred, with paler face and forehead, and pinker breast, while crown and nape also have strong blue tinge; *carteretia* similar to *kerstingi* but paler, with more buff on forehead and face of male, light pink breast and light tawny underparts, while female is spotted with whitish buff on throat and breast; *doreya* has neck and upper breast pale pinkish brown, with or without barring; male *majorensis* has slate grey crown and nape with green gloss to hindneck; male *albigapilla* has cream-coloured forehead, grey tinted crown, strongly barred breast with no pink tinge, and upperparts richer chestnut than in other races.

Habitat. Inhabits forest edge in gallery woodland, isolated tree groups in grassland, forest, second growth and gardens. In mainland New Guinea, occurs from sea-level up to 1800 m, locally to 2100 m; up to 2000 m in Sulawesi, but usually not above 1500 m in Wallacea, and above 1600 m occurs only in disturbed habitat; in New Britain and New Ireland inhabits lowlands up to 900 m. Usually seen singly or in pairs, but occasionally in groups of up to 8-20 individuals.

Food and Feeding. Small fruits, seeds and nuts comprise diet; grass seeds have been recorded in gizzard. In primary forest, it is found feeding in middle to canopy level; in other habitats, it frequents and feeds mostly on low trees and shrubs; known to feed and take grit on the ground occasionally.

Breeding. Little data available on seasonality, but perhaps breeds all year round; pair observed displaying in Nov on Buru; in New Guinea breeding (usually nests with eggs) has been reported Mar-Apr, Jun and Aug-Oct. Nest is large and made of twigs and sticks, as well as leaf and fern fragments; 9 cm deep, 25-30 cm across and 0.9-4.6 m above ground; placed in masses of vines and ferns, on the large leaf of a pandanus, or in a group of branches near the top of a small tree, close to the stem. Lays 1 white or yellowish white egg; incubation by both sexes.

Movements. No information.

Status and Conservation. Not globally threatened. Race *sanghirensis* is common on Siau and Sangihe Is, but present at lower densities in Talaud Is. Nominant race common and widespread on Buru, and fairly common on Seram. Widespread throughout New Guinea where considered fairly common to common. Extensive range, apparent adaptability to disturbed habitats and suggested relative abundance imply species probably fairly secure at present.

Bibliography. Andrew (1992), Beehler (1978b), Beehler *et al.* (1986), Bellchambers *et al.* (1994), Bishop (1992), Bowler & Taylor (1989), Christidis & Boles (1994), Coates (1985), Coates & Bishop (1997), Diamond (1972a), Frith, H.J. (1977), Gibbs (1990), Gilliard & LeCroy (1961), Gregory (1995a, 1995b, 1995c), Hoogerwerf (1964a, 1971), Jepson (1993), Lamonthe (1979, 1986), Mayr (1944b), Mayr & Rand (1937), Mees (1982a), Rand (1942a), Rand & Gilliard (1967), Ripley (1964), Rösler (1996), Rozendaal & Dekker (1989), Rutgers & Norris (1970), White & Bruce (1986).

71. Brown Cuckoo-dove

Macropygia phasianella

French: Phasianelle brune **German:** Maronentaube **Spanish:** Tórtola-cuco Parda
Other common names: Large Brown Cuckoo-dove, Pheasant(!)/Brown/Pheasant-tailed Pigeon

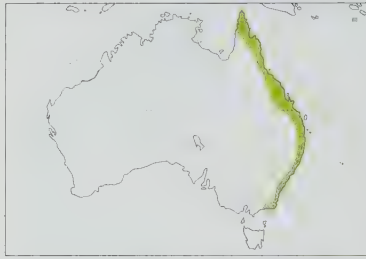
Taxonomy. *Columba phasianella* Temminck, 1821, Sydney, New South Wales.

May form superspecies with *M. amboinensis*, *M. magna*, *M. rufipennis*, *M. tenuirostris* and *M. emiliana*, and all six sometimes considered conspecific; various other combinations proposed with present species normally considered to be closest to *M. amboinensis* and *M. magna*; species limits poorly understood, and further study required in order to clarify precise relationships within this complex. Monotypic.

Distribution. E Australia from tip of Cape York Peninsula (N Queensland) to E Victoria, in coastal regions and adjacent highlands.

Descriptive notes. 39-45 cm; 150-240 g. Head, neck and underparts rufous brown, greyer on crown and nape; chin and narrow streak below eye cream-coloured; hindneck, sides of neck and upper mantle dark grey, with purple or green iridescence; rest of upperparts dark brown, with narrow rufous fringes to inter-scapular feathers and tertials; tail very long and graduated; centre dark brown, outer feathers rufous, with broad black subterminal band; bill grey-black; legs and feet pink-red.

On following pages: 72. Dusky Cuckoo-dove (*Macropygia magna*); 73. Andaman Cuckoo-dove (*Macropygia rufipennis*); 74. Philippine Cuckoo-dove (*Macropygia tenuirostris*); 75. Ruddy Cuckoo-dove (*Macropygia emiliana*); 76. Black-billed Cuckoo-dove (*Macropygia nigrirostris*); 77. Mackinlay's Cuckoo-dove (*Macropygia mackinlayi*); 78. Little Cuckoo-dove (*Macropygia ruficeps*); 79. Great Cuckoo-dove (*Reinwardtoena reinwardtii*); 80. Pied Cuckoo-dove (*Reinwardtoena brownii*); 81. Crested Cuckoo-dove (*Reinwardtoena crassirostris*); 82. White-faced Cuckoo-dove (*Turacoena manadensis*); 83. Black Cuckoo-dove (*Turacoena modesta*).



Female similar, but typically has bright chestnut cap and prominent dark brown scalloping to sides of neck and breast; lacks pink tinge below and iridescence above. Juvenile similar to adult female, but chestnut cap even more distinct, with black speckling; cheeks and ear-coverts buff, with fine dark barring; chin and throat brown; upperparts have broader and brighter rufous fringes, giving brighter rufous effect above; bold blackish scalloping to upper mantle, neck and breast; bill grey-brown, legs and feet reddish grey.

Habitat. Rain forest and wet sclerophyll forest, particularly at edges, in clearings and in early secondary stages. Usually found in pairs or small parties and considerable concentrations may occur at times of exceptional food abundance.

Food and Feeding. Feeds on fruit and seeds; important food plant families include Araliaceae, Solanaceae, Rutaceae, Dilleniaceae, and Euphorbiaceae. In a study in Queensland, 81% of foraging time was spent gathering fleshy fruits and 19% gathering seeds. Unlike fruit pigeons (*Ptilinopus*, *Ducula*, *Lopholaimus*), present genus has a muscular gizzard capable of digesting seeds. Active and acrobatic when feeding, using long tail for balance. Most foraging is in low bushes and in the forest understorey, though canopy fruits are also taken; often found in shrubby weeds, especially wild tobacco (*Solanum mauritianum*) and lantana (*Lantana camara*). Will gather gravel to aid digestion.

Breeding. Extended breeding season, with apparent peak in local spring and early summer; of 26 nests with eggs in N New South Wales, 23 were found in Sept-Jan. Nest made of dry sticks; varies from very flimsy to substantial, and placed in a variety of sites, including horizontal forks, vine tangles and tops of tree-ferns. Lays 1 egg, rarely 2, dull white or cream and usually glossy; incubation 16-18 days; at hatching, chick covered with long, thick yellow down and weighs 10 g; by day 7, quills are prominent on all body tracts and primaries have begun to burst; fledging occurs at 16 days; moult into adult plumage does not occur until at least 70 days.

Movements. Appears to be locally nomadic. Regular changes in local numbers have been noted in response to food availability e.g. in N Queensland, but species is typically present all year round. Flight, usually through understorey and rarely above canopy, is direct and strong, with slow wingbeats.

Status and Conservation. Not globally threatened. Remains common in areas where patches of rain forest remain, but also adapts readily to secondary forest, and not so seriously affected by habitat fragmentation as are other pigeons of rain forest. Expanding in S portion of range, e.g. in NE New South Wales, where total state population estimated as over 15,000 birds.

Bibliography. Blakers *et al.* (1984), Carter & Sudbury (1977), Christidis & Boles (1994), Crome (1975a), Frith, H.J. (1952a, 1977, 1982), Higgins & Davies (1996), Innis (1989), Lindsey, T.R. (1992), Macdonald (1988), Mayr (1944b), Pizzey & Doyle (1980), Rutgers & Norris (1970), Schodde & Tidemann (1986), Simpson & Day (1996), Tronson & Tronson (1987).

72. Dusky Cuckoo-dove

Macropygia magna

French: Grande Phasianelle **German:** Schweiftaupe **Spanish:** Tórtola-cuco Grande
Other common names: Large/Barred-necked Cuckoo-dove

Taxonomy. *Macropygia magna* Wallace, 1864, Timor.

May form superspecies with *M. amboinensis*, *M. phasianella*, *M. rufipennis*, *M. tenuirostris* and *M. emiliana*, and all six sometimes considered conspecific; various other combinations proposed with present species normally considered to be closest to *M. amboinensis* and *M. phasianella*; species limits poorly understood, and further study required in order to clarify precise relationships within this complex. Four subspecies recognized.

Subspecies and Distribution.

M. m. macassariensis Wallace, 1865 - SW Sulawesi (possibly) and islands of Tana Keke and Salayar.

M. m. longa Meise, 1930 - Tanahjampea and Kalaotoa (S of Sulawesi).

M. m. magna Wallace, 1864 - E Lesser Sundas, on Timor, Alor, Wetar, Romang, Kisar, Leti, Moa and Sermata.

M. m. timorlaoensis A. B. Meyer, 1884 - Tanimbar Is (Yamdena, Larat, Selaru).



Descriptive notes. 44 cm. Head golden-brown to chestnut-red, faintly black barred; throat pale straw; neck, upper mantle, breast and underparts light golden-brown barred blackish; back and rump darker with faint barring; wing-coverts dark red-brown, suffused with blackish bars and dark grey flecks; primaries and outer secondaries blackish edged buff; underwing chestnut; undertail-coverts light chestnut; rectrices dull reddish brown, outermost pair with poorly-defined blackish subterminal bands; iris blue grey with outer ring of red or orange; bill brown to blackish, paler tip to lower mandible; feet brownish red

or purplish red. Female similar but breast mostly reddish brown, with pale spots and barring very faint. Juvenile similar to female. Races differ mainly in plumage tones, *macassariensis* notably paler, *timorlaoensis* intermediate.

Habitat. Almost no information available on habitat preferences, but species known to occur in primary forest and tall secondary forest up to at least 1000 m in W Timor. Elsewhere in Lesser Sundas, occurs in monsoon forest, second growth and forest edge. Occurs singly, in pairs or small groups.

Food and Feeding. No information available on food; probably takes similar items to related species. Feeds in middle storey and lower canopy.

Breeding. No information available.

Movements. Status in Sulawesi uncertain, and presence may relate to wandering or vagrant individuals.

Status and Conservation. Not globally threatened. Extremely little published information on status. Apparently not uncommon locally, e.g. on Tanahjampea I, based on observations during a visit of two days in Sept 1993; likewise seems to be not uncommon on Kalaotoa and Yamdena Is, but uncommon on Timor. Status in Sulawesi unclear, where no record since collection of type speci-

men of race *macassariensis*, so validity of this as type locality was seriously doubted; however, rediscovered specimen from offshore island of Tana Keke (not far from Ujung Pandang = Macassar) suggests possibility of vagrant from this island to mainland Sulawesi, or even former existence of a small mainland population; a few possible sight records in Sulawesi in recent decades, but no conclusive evidence of presence there. Research needed.

Bibliography. Andrew (1992), Coates & Bishop (1997), Dutton (1995), Gibbs (1990), Holmes & Wood (1980), Jepson & Monk (1995), Mayr (1944b), Mees (1972), Noske (1995), Rösler (1996), Sujatnika *et al.* (1995), White & Bruce (1986).

73. Andaman Cuckoo-dove

Macropygia rufipennis

French: Phasianelle des Nicobar **German:** Rotsteihtaube **Spanish:** Tórtola-cuco de Andamán
Other common names: Nicobar Cuckoo-dove

Taxonomy. *Macropygia rufipennis* Blyth, 1846, southern Nicobars.

May form superspecies with *M. amboinensis*, *M. phasianella*, *M. magna*, *M. tenuirostris* and *M. emiliana*, and all six sometimes considered conspecific; present species shares plumage characters with *M. phasianella* and *M. magna*, but also with *M. unchall*, and has been suggested to have originated from stock of this last species; species limits within group poorly understood, and further study required in order to clarify precise relationships within this whole complex. Proposed races *andamanica* of Andamans and *tiwarii* of Great Nicobar not generally recognized. Monotypic.

Distribution. Andaman and Nicobar Is.



Descriptive notes. 39-40 cm; 230-285 g. Head and nape rufous to chestnut, paler on cheeks and throat; hindneck reddish brown to pale yellow-brown, barred and flecked with black; sides of neck and breast reddish brown to chestnut barred with black, giving way to dusky bars and flecks on the belly; undertail-coverts chestnut; mantle, back and wings dark brown with black barring and rusty fringes; underwing mostly chestnut; rump, uppertail-coverts and central rectrices reddish brown; outer rectrices lighter coloured with blackish subterminal bands and basal areas; iris pale blue with outer purplish red ring; orbital skin

greyish blue; bill pinkish to pinkish purple; legs and feet pinkish red or pinkish horn. Female redder in general appearance; crown more rusty with black speckling; sides of neck, breast and underparts rusty with little or no barring or speckling; wing-coverts with broad rusty tips; primaries and secondaries mostly rusty chestnut, tipped and flecked with blackish brown. Juvenile similar to female but hindneck and mantle have more conspicuous barring, and plumage less reddish throughout.

Habitat. Lives in heavy evergreen and secondary forest.

Food and Feeding. Takes various fruits and berries, notably those of *Vitis* and *Leae*; staple food in some areas appears to be bird's-eye chili (*Capsicum fastigiatum*) which grows commonly in secondary jungle and at edges of clearings. Usually feeds in trees, but also on ground.

Breeding. Nest and eggs undescribed. Males with enlarged testes have been collected Feb-Apr.

Movements. No information.

Status and Conservation. Not globally threatened. Currently considered near-threatened. Very little recent information on status, but species is reported to be not uncommon. Biology virtually unknown; research required on this and many other endemic birds of these poorly known islands.

Bibliography. Abdulali (1964, 1978), Ali & Ripley (1981), Hume (1874), Mayr (1944b), Ripley (1982), Rösler (1996), Tikader (1984).

74. Philippine Cuckoo-dove

Macropygia tenuirostris

French: Phasianelle des Philippines **German:** Philippinentaube **Spanish:** Tórtola-cuco Filipina
Other common names: Reddish Cuckoo-dove

Taxonomy. *Macropygia tenuirostris* Bonaparte, 1854, vicinity of Manila, Philippines.

May form superspecies with *M. amboinensis*, *M. phasianella*, *M. magna*, *M. rufipennis* and *M. emiliana*, and all six sometimes considered conspecific; various other combinations proposed, with present species perhaps closest to *M. phasianella* or *M. emiliana*, having at times been listed as subspecies of one or other; species limits of group poorly understood, and further study required in order to clarify precise relationships within this whole complex. N populations have been awarded races *phaea* (Lan Yu Is and Calayan) and *septentrionalis* (Batan), but validity unclear; in such an arrangement, race present in Taiwan uncertain. Monotypic.

Distribution. Taiwan and nearby Lan Yu (Hung-t'ou Hsü) Is; Philippines, on Batan, Calayan, Luzon, Mindoro, Sibuyan, Palawan, Negros, Bohol, Siquijor, Mindanao and Sulu Archipelago.



Descriptive notes. 38-5 cm; 157-191 g. Head and neck cinnamon rufous; amethyst sheen on hindneck and upper mantle; minute brown freckles on mantle; back, rump, wing and tail dark chestnut-brown, tinged slightly purple; breast and belly cinnamon rufous; primaries brown; inner margins of primaries and underwing-coverts rufous cinnamon; three outermost rectrices bright rufous, broad black bands on bases of inner web; iris yellow with outer ring of crimson; orbital ring and base of bill crimson; bill light brown, feet carmine. Female has head and underparts cinnamon, throat pale rufous, breast with conspicuous

grey bases and cinnamon edges; upperparts deep brown, hindneck and upper mantle barred fulvous and black; rump and uppertail-coverts deep chestnut, with minute brown freckles. Juvenile resembles adult female in coloration but has upperwing-coverts and inner secondaries edged cinnamon.

Habitat. Forest, second growth and clearings in Philippines, occurring up to c. 1600 m. Prefers heavily wooded areas and ravines on Taiwan.

Food and Feeding. No precise information about diet; species frequents fruiting trees including *Ficus* in new clearings, forest edge alongside cultivation, and second growth, as well as in primary forest. Characteristically found in singles, pairs or groups of 5-8 birds.

Breeding. Very little information, and only 2 nests described: single egg found in a depression in a vertical cliff under closed canopy forest in late Mar on Sibuyan I; and a nest and egg were found on Batan in Jun; a fledgling was discovered on Luzon in Jan. Other breeding data all from specimens or trapped birds: a female collected in late Apr on Bohol had a hard-shelled egg ready for laying; data from Sibuyan I include a male with enlarged gonads in Mar, and females with enlarged ovaries in Feb and May; and in S Luzon, birds in breeding condition taken in late Mar.

Movements. Resident. Fast flight over forest canopy.

Status and Conservation. Not globally threatened. Widely distributed and locally common in Philippines, where appears to be able to withstand forest destruction better than do many forest bird species. Reported to be fairly common on Lan Yu Is, but no recent information regarding status in Taiwan.

Bibliography. Alonzo-Pasicolan (1992), Brooks, Dutson *et al.* (1996), Danielsen *et al.* (1994), Delacour & Mayr (1946), Dickinson *et al.* (1991), DuPont (1971), DuPont & Rabor (1973a), Evans, Dutson & Brooks (1993), Goodman & Gonzales (1990), Goodman *et al.* (1995), Manuel (1937), Mayr (1944b), McGregor (1909-1910), Rabor (1955, 1977), Rand & Rabor (1960), Ripley & Rabor (1958), Rösler (1996), Severinghaus & Blackshaw (1976).

75. Ruddy Cuckoo-dove

Macropygia emiliana

French: Phasianelle rousse **German:** Indonesientaube **Spanish:** Tórtola-cuco Indonesia
Other common names: Sunda Red/Indonesian Cuckoo-dove

Taxonomy. *Macropygia emiliana* Bonaparte, 1854, central Java.

May form superspecies with *M. amboinensis*, *M. phasianella*, *M. magna*, *M. rufipennis* and *M. tenuirostris*, and all six sometimes considered conspecific; various other combinations proposed, and present species has been listed as race of *M. phasianella*; species limits of group poorly understood, and further study required in order to clarify precise relationships within this whole complex. Race *cinnamomea* has been treated as a full species. Seven subspecies recognized.

Subspecies and Distribution.

M. e. borneensis Robinson & Kloss, 1921 - N Borneo.

M. e. hypoperca Oberholser, 1912 - Simeulue (W of Sumatra).

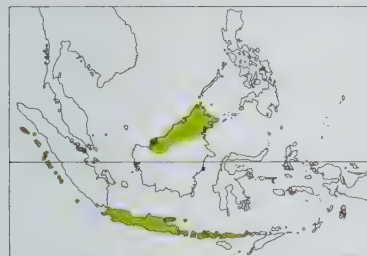
M. e. modiglianii Salvadori, 1887 - Nias (W of Sumatra).

M. e. elassa Oberholser, 1912 - Mentawai Is of Siberut, Sipura and Pagai Is (W of Sumatra).

M. e. cinnamomea Salvadori, 1892 - Enggano (W of Sumatra).

M. e. emiliana Bonaparte, 1854 - Java and Krakatau (W of Java), Bali, Lombok, Sumbawa, Flores and Paloe (N of Flores).

M. e. megala Siebers, 1929 - Kangean Is (off NE Java).



Descriptive notes. 30-37 cm. Rich reddish brown overall coloration; breast purplish brown with inconspicuous black barring; neck and breast with pink iridescence; iris has pale bluish inner ring with red outer ring; bill creamy grey; feet purplish red. Female similar to male but lacks neck and breast iridescence; dark barring on mantle conspicuous. Juvenile female has feathers of lower throat black with rufous centres. Races differ mainly in size, coloration and intensity of barring; *cinnamomea* much brighter rufous cinnamon.

Habitat. Primary forest, tall secondary forest, glades and small openings in forests; occurs in

lowlands up to 1500 m in Java, to 1000 m in Borneo, to 400-1520 m on Lombok, c. 300-1000 m on Sumbawa, and from sea-level to 1200 m on Flores. Usually avoids cultivated land (unlike *M. ruficeps*), but will use wooded cultivation in Lesser Sundas. Feeds and drinks on ground. Occurs singly or in pairs.

Food and Feeding. No data on food items, but known to forage in the midstorey and lower canopy in Lesser Sundas.

Breeding. Little information. Nesting apparently occurs all year round in Java and Bali; Apr-Jul on Flores. Builds a simple twig nest in a small tree. Clutch 1 cream-coloured egg.

Movements. Probably resident. Flight noticeably slower than that of *M. ruficeps*.

Status and Conservation. Not globally threatened. Locally common in hill forests of Borneo, Java, Bali and Flores. Said to be not uncommon on islands off W Sumatra, although limited information available: several sightings on Nias in May 1990, but not recorded during brief survey of Simeulue in Aug 1995; current status of each endemic race on these islands requires checking. Status on mainland Sumatra uncertain, where species is possibly only vagrant; reported once from mainland, and also from islands in Lampung Bay (S Sumatra). Generally uncommon in Lesser Sundas.

Bibliography. Andrew (1992), Bruce (1987), Coates & Bishop (1997), Dymond (1994), Gibbs (1990), Hellebrekers & Hoogerwerf (1967), Holmes (1994a, 1996), Hoogerwerf (1965), Junge (1938b), MacKinnon (1988), MacKinnon & Philipps (1993), van Marle & Voous (1988), Mayr (1944b), Smythies (1981), White & Bruce (1986), Wilkinson, Dutson & Sheldon (1991).

76. Black-billed Cuckoo-dove

Macropygia nigrirostris

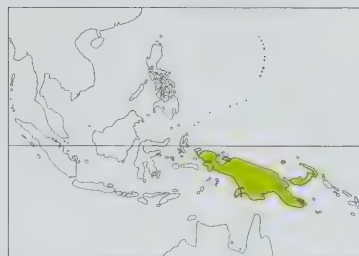
French: Phasianelle barrée **German:** Kastanientaube **Spanish:** Tórtola-cuco Piquinegra
Other common names: (Lesser) Bar-tailed/Black-billed Cuckoo-dove

Taxonomy. *Macropygia nigrirostris* Salvadori, 1875, Arfak and Warbusi.

Forms a superspecies with *M. mackinlayi* and *M. ruficeps*. Monotypic.

Distribution. New Guinea, offshore islands of Yapen and Karkar, larger islands of Bismarck Archipelago and Lihir Is, and D'Entrecasteaux Is (Goodenough, Fergusson).

Descriptive notes. 29-30 cm; 66-104 g. Rich chestnut-red throughout, darker on wings, paler below; outer primaries and secondaries brownish black edged rufous; uppertail-coverts faintly barred black; central rectrices rich chestnut barred with black; outermost rectrices pale chestnut with broad black subterminal bands; slight barring on mantle and breast; iris pale grey or white surrounded by a black ring and red orange to yellow outer ring; orbital skin red; feet red, purple or pink; bill black, brownish black or brown. Female lighter chestnut, golden buff on back with conspicuous black barring on back and breast; tail similar to male but barring more conspicuous; feet brownish. Juvenile similar to female but tail irregularly barred.



Habitat. Occurs from sea-level up to 2600 m in New Guinea, 300-900 m on Karkar I. In lowlands and foothills occurs mainly at forest edge and in regrowth; in mountains of New Guinea, occupies forest interior. Usually seen singly, in pairs or in small groups of as many as 20 birds feeding at fruiting trees.

Food and Feeding. Very limited information. Takes fruits and seeds in trees, occasionally coming to the ground to drink during dry weather. Stomachs have also been found to contain pebbles.

Breeding. Few data on seasonality, but a nestling and a juvenile obtained in Oct. Two ground

nests were found on a steep hill near Wau; some birds use a more elevated site such as an epiphytic fern in a small tree. Clutch normally consists of 1 egg, but one clutch of 2 eggs was recorded. In captivity, a chick hatched after 17 days.

Movements. Apparently resident; vagrant to Watom I (off NE New Britain), where *M. mackinlayi* is the resident member of the genus.

Status and Conservation. Not globally threatened. Very few data available, but species seems to be fairly common in much of mainland New Guinea, especially in hills and mountains, though rare on Karkar I. No information available for rest of range.

Bibliography. Andrew (1992), Bailey (1992a), Beehler (1978b), Beehler *et al.* (1986), Coates (1985), Diamond (1972a, 1975c), Eastwood (1995c), Filewood (1970), Gregory (1995a, 1995b), Heinroth (1902), Hiaso *et al.* (1994), Mayr & Rand (1937), Orenstein (1976), Pratt (1982), Rand & Gilliard (1967), Ripley (1964), Rösler (1996), Rowland (1995), Schmid (1993).

77. Mackinlay's Cuckoo-dove

Macropygia mackinlayi

French: Phasianelle de Mackinlay **German:** Mackinlaytaube **Spanish:** Tórtola-cuco de Mackinlay
Other common names: Spot-breasted/Rufous (Brown)/Black-spotted/Dimorphic Cuckoo-dove, Rufous Pheasant-pigeon, Rufous-brown Pheasant-dove

Taxonomy. *Macropygia mackinlayi* E. P. Ramsay, 1878, Tanna Island.

Forms a superspecies with *M. nigrirostris* and *M. ruficeps*. Race *krakari* has been regarded as invalid. Four subspecies recognized.

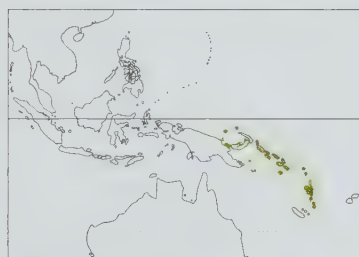
Subspecies and Distribution.

M. m. goodsoni Hartert, 1924 - Admiralty and St Matthias Is, Squally, Watom (off NE New Britain) and Witu Is; also Talasea district of WC New Britain.

M. m. krakari Rothschild & Hartert, 1915 - Karkar I.

M. m. arossi Tristram, 1879 - Solomon Is.

M. m. mackinlayi E. P. Ramsay, 1878 - Santa Cruz Is, Banks Is and Vanuatu.



Descriptive notes. 27-31 cm; 87 g. Polymorphic in nominate race, with grey and rufous morphs. Rufous morph male is deep reddish brown all over, darkest on upperparts but lighter on head and neck; underparts with a tawny tinge; outer primaries and secondaries brownish black narrowly edged rufous; central rectrices dark brown, outer ones paler tipped greyish rufous with a broad black subterminal band; breast feathers bifurcate, black basally with red-brown tips, giving spotted appearance to breast; iris yellow, orange to red; bill black; feet and legs red. Grey morph male has dark grey upperparts with broad pale grey fringes

to most feathers; head and underparts pale grey, forehead, throat and breast sometimes pale tawny silver; speckled grey or buffish grey throughout. Rufous morph female mostly yellow-brown with grey suffusion to neck and breast giving vermiculated appearance; grey morph female similar in colour to corresponding male, but has more conspicuous black bases to breast feathers; underparts with more noticeable buff tinge. Juvenile rufous morph similar to adult female but redder throughout with blackish barring; feathers of upperparts often with rufous tips and black subterminal spots. Juvenile grey morph mainly dark grey above, pale grey below with greyish buff tips and black subterminal bars to most feathers; crown and breast feathers blackish, tipped pale buffish grey. Other races monomorphic in coloration, resembling rufous morph nominate, but richer in colour. Race *arossi* rich chestnut red with purplish tinge to upperparts; female slightly paler than male, face and breast more golden rufous and breast more evidently spotted.

Habitat. Inhabits second growth, clearings, gardens and disturbed areas in primary forest; occurs at middle levels and in the lower canopy. Principally a lowland species, commonest at 200-800 m in N Solomons, but occurs as high as 1500 m on Bougainville, and up to 1000 m on Karkar I. Distribution markedly disjunct on smaller islands of Bismarck Archipelago, where present species and *M. nigrirostris* are invariably allopatric, with only one of the species occupying any particular island. Usually seen singly, in pairs or in small groups of up to 5-6 birds.

Food and Feeding. Feeds on seeds and small fruits including, in Vanuatu, those of the introduced chilli bush (*Capsicum frutescens*) and *Lantana* shrubs, but also vegetable shoots. Usually feeds below the canopy in small trees, especially *Parasponia*, but will occasionally come to the ground to take food put out for domestic animals.

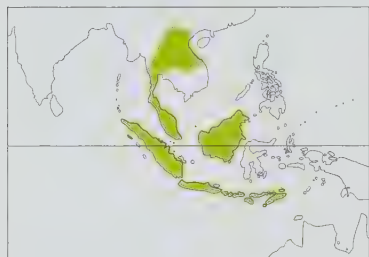
Breeding. Season Sept-Feb in Vanuatu. Nest is saucer-shaped platform of the typical pigeon structure in a palm, tree-fern, vine-tangle or epiphytic bird-nest fern, 3-6 m above ground; however, a nest of an unidentified cuckoo-dove found in Mar on Tuluman I (Admiralty Is), and considered to be this species, was located in a rock depression, in an elevated situation. Lays 1, occasionally 2 white eggs.

Movements. Suspected of being merely a vagrant to New Britain, where it is rare; also one sight record from mainland New Guinea in Jun 1973.

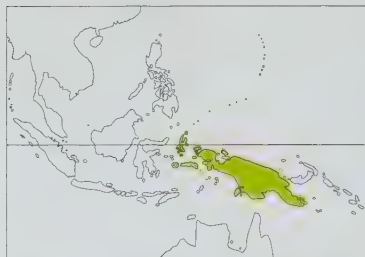
Status and Conservation. Not globally threatened. Considered to be fairly common on Karkar I; widespread but only locally common through the Solomons; fairly common though not numerous throughout most of Vanuatu, but rare on Aneityum. Receives partial protection under Vanuatu law, it being permissible to hunt the species only from Apr to Jun (inclusive).

Bibliography. Beehler *et al.* (1986), Bregulla (1992), Cain & Galbraith (1956), Coates (1985), Diamond (1975c), Diamond & LeCroy (1979), Eastwood (1995a), Gregory (1995c), Hadden (1981), Mayr (1945b), Meyer (1933), Rand & Gilliard (1967), Sibley (1951).

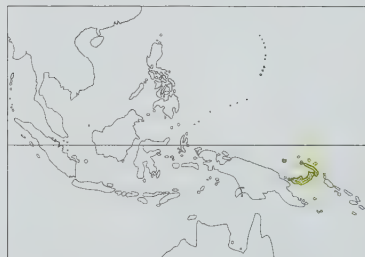
78. Little Cuckoo-dove

*Macropygia ruficeps***French:** Phasianelle à tête rousse **Spanish:** Tórtola-cuco Chica**German:** Kleine Kuckuckstaube**Other common names:** Red-faced/Red-headed/Lesser Red Cuckoo-dove**Taxonomy.** *Columba ruficeps* Temminck, 1834, Java.Forms a superspecies with *M. nigrirostris* and *M. mackinlayi*. Eight subspecies recognized.**Subspecies and Distribution.***M. r. assimilis* Hume, 1874 - Myanmar (Karennee and Shandoung S to Muleyit, S Shan States) and SC China (S Yunnan) to W, NW & NE Thailand.*M. r. engelbachi* Delacour, 1928 - NW Vietnam (W Tonkin) and N Laos.*M. r. malayana* Chasen & Kloss, 1931 - Peninsular Malaysia.*M. r. simalurensis* Richmond, 1902 - Simeulue I.*M. r. sumatrana* Robinson & Kloss, 1919 - Sumatra.*M. r. nana* Stresemann, 1913 - Borneo including Sibatik I.*M. r. ruficeps* (Temminck, 1834) - Java and Bali.*M. r. orientalis* Hartert, 1896 - Lesser Sundas, on Lombok, Sumbawa, Komodo, Flores, Pantar, Sumba and Timor.**Descriptive notes.** 27-30 cm; 74-88 g. A reddish brown pigeon, darkest above and palest on head and belly; mantle, back and wing-coverts reddish brown with redder and lighter fringes to feathers; head and face light rufous to golden brown, throat paler, neck and breast darker and more reddish; creamy pale tips to some breast feathers; back and sides of neck flecked black with bronzy green or lilac sheen; primaries and outer secondaries dull brownish black; central rectrices dark red-brown, outer rectrices chestnut with black subterminal bars; underside of wings mostly chestnut; iris pale blue to white; orbital skin grey; billbrown; legs and feet red to purplish red. Female slightly duller; iridescence of neck much reduced or absent; breast more heavily spotted. Juvenile similar to female but redder and more conspicuously barred and spotted, most feathers edged with rust or rufous with blackish subterminal areas. Race *orientalis* somewhat larger and duller; *assimilis* similar to nominate but slightly paler in colour with more conspicuous spots in female breast feathers and pale fringes to male's breast feathers; *malayana*, *simalurensis*, *sumatrana* and *nana* more richly coloured than *assimilis*, upperparts redder with broad chestnut fringes on wing and mantle, hindneck iridescence wine red (sometimes looking green) and broad blackish spots on most breast feathers, lower breast and belly lighter golden brown; female of these races duller below than male with conspicuously mottled breast, hindneck and upper mantle barred blackish or iridescent green and rusty fawn with contrasting chestnut edges, wing-coverts with blackish bases.**Habitat.** Lower montane and hill forests, light woodland and lightly wooded cultivation in Borneo, Sumatra and Lesser Sundas; in Java and Bali, may be found in large numbers in mountains at 300-2000 m, and up to 2500 m on Flores. Generally prefers forest edge. Occurs singly or in pairs, but occasionally in large concentrations.**Food and Feeding.** Takes berries, seeds, rice and chillies. Feeds on ground or in trees, where typically forages in the middle storey or lower canopy. Flocks will invade cultivated areas, particularly rice fields. Visits ground to swallow grit or drink from puddles.**Breeding.** Data on seasonality limited: nests in Jan-Feb, May-Aug and Oct in Malaysia; Feb-Mar and Jul-Aug in Borneo; 1 nest in Sumatra in Jun; recorded in May on Sumbawa; and stated to breed all year round on Java and Bali. Nest typical pigeon structure that may be constructed partly or entirely of a pad of moss or grass; placed in tree or shrub, 1-7 m above ground; once in the tree-fern *Asplenium nidus*. Normally 1 buff, white or cream egg, but clutches of 2 eggs have been reported e.g. in Malay Peninsula.**Movements.** Resident throughout much of range but performs localized feeding movements, e.g. in Malaysia, where birds principally nest above 900 m but regularly wander as far as the lowlands in search of food.**Status and Conservation.** Not globally threatened. Widely distributed and generally common to locally abundant throughout much of SE Asia, the Greater and Lesser Sundas; common at Fraser's Hill (Peninsular Malaysia), and also at Mt Kinabalu (NE Borneo). Extremely rare in SW China, where recorded only from Xishuangbanna (S Yunnan) in Nov; uncommon in Thailand. Extensive range, rather wide altitudinal tolerance and apparent adaptability to environments modified by man suggest species relatively secure.**Bibliography.** Baker (1913), Cheng Tsohsin (1987), Coates & Bishop (1997), Davison (1992, 1995), Deignan (1945), Hellebrekers & Hoogerwerf (1967), Holmes (1996), Lekagul & Round (1991), MacKinnon (1988), MacKinnon & Phillips (1993), Madoc (1976), van Marle & Voous (1988), McClure (1964), Medway & Wells (1976), Meyer de Schauensee & Ripley (1940), Robinson (1928), Rösler (1996), Round (1988), Smythies (1981, 1986), Thiollay (1995), White & Bruce (1986), Wilkinson, Dutson & Sheldon (1991), Yang Lan *et al.* (1995).Genus *REINWARDTOENA* Bonaparte, 1854

79. Great Cuckoo-dove

*Reinwardtoena reinwardtii***French:** Phasianelle de Reinwardt **German:** Reinwardttaube **Spanish:** Paloma Rabuda Papú
Other common names: Giant/Reinwardt's/Long-tailed Cuckoo-dove, Crested Long-tail Pigeon, Crested Pigeon(!)**Taxonomy.** *Columba reinwardtsi* [sic] Temminck, 1824, Sulawesi; error = Ambon.Genus probably closest to *Macropygia*, which it resembles in shape and colour pattern of outer rectrices. Similar plumage patterns of present species and *R. browni* suggest they are quite closely related. Temminck himself subsequently emended the species name to *reinwardtii*. Birds of Buruhave been awarded separate race, *albida*, but doubtfully distinct. Three subspecies currently recognized.**Subspecies and Distribution.***R. r. reinwardtii* (Temminck, 1824) - Moluccas, on Morotai, Halmahera, Kayoa, Bacan, Obi, Buru, Ambon, Seram and Seram Laut.*R. r. griseotincta* Hartert, 1896 - W Papuan Is (Misool, Waigeo, Salawati) through New Guinea and offshore islands of Yapen and Mios Num in Geelvink Bay, Manam and Karkar, to D'Entrecasteaux Is (Goodenough, Ferguson).*R. r. brevis* J. L. Peters, 1937 - Biak I.**Descriptive notes.** 47.5-52.5 cm; 208-305 g. Very long tail; head, neck, breast and underparts pale bluish grey, darker on flanks and undertail-coverts; throat white; breast feathers often washed pink and fringed pinkish, creamy white or white; mantle, back, rump, uppertail-coverts and central rectrices rich chestnut; wing-coverts and scapulars dark chestnut; secondaries, primaries and their coverts black; outermost pair of rectrices greyish white on outer webs with black subterminal bands; inner webs with broad black bands and grey tips; next pair of rectrices black basally, grey centrally with black and chestnutsubterminal band; next pair tipped with broad chestnut bands; amount of chestnut increases progressively, with only a little black and grey basally; underwing black; iris yellowish white or pink with red outer ring; orbital skin purplish pink to wine red; bill brown distally, occasionally with white tip; base and cere red to purplish pink; legs and feet red, pink or purplish red. Female can have orbital skin duller or more brownish red and iris more yellowish. Juvenile brown, darker on wings with dirty white throat; rump and uppertail-coverts reddish brown, fringed darker; central rectrices sooty brown with chestnut wash; some mantle and wing feathers fringed rufous. Race *griseotincta* larger and darker, notably on breast; *brevis* very similar to nominate. Clinal variation in colour tone within nominate race, with darkest birds in N and palest in SW.**Habitat.** Principally in canopy and middle level in primary forest, but also frequents forest edge, second growth and gallery forest. Occurs from sea-level up to tree-line at 3380 m on mainland, and up to 1190 m on Karkar I; considered to be commonest between 800-1400 m in Moluccas; lowland birds tend to occur in the vicinity of hills. Often solitary, but may be found in pairs or groups of up to 10, feeding on fruiting trees.**Food and Feeding.** Feeds on a variety of small seeds and fruit; pebbles found in some stomachs. Known to prefer fruit from *Schefflera* and related plants of Araliaceae. Comes to the ground periodically to feed.**Breeding.** Little data on seasonality except from New Guinea, where species apparently breeds all year round, perhaps peaking in Oct-Nov, but nests or young found Mar-Jun, Aug and Oct-Dec, and birds in breeding condition found in several other months; a nestling was found on Buru in Feb. Nest is a flat structure of sticks, or with sticks, roots, moss and ferns, placed 1.2-5 m above the ground in a bush or tree; local people report nests on ledges in caves or river gorges. Clutch 1 white egg; incubation perhaps by both sexes.**Movements.** No information.**Status and Conservation.** Not globally threatened. Very little information available on status. Overall, species is fairly common in Papua New Guinea; not uncommon in S & SE, but uncommon in NE. Fairly common to common in hills of Seram, but scarce in lowlands.**Bibliography.** Andrew (1992), Beehler (1978b), Beehler & Finch (1985), Beehler *et al.* (1986), Bell (1969b, 1982), Bowler & Taylor (1989), Coates (1985), Coates & Bishop (1997), Diamond (1972a), Diamond & LeCroy (1979), Gibbs (1990), Gilliard & LeCroy (1961), Gregory (1995a, 1995b), Harrison & Frith (1970), Jepson (1993), Mayr & Rand (1937), Rand (1942b), Rand & Gilliard (1967), Ripley (1964), Rowland (1995), Schmid (1993), White & Bruce (1986).

80. Pied Cuckoo-dove

*Reinwardtoena browni***French:** Phasianelle de Brown**Spanish:** Paloma Rabuda de Nueva Bretaña**German:** Schwarzzaube**Other common names:** Brown's Long-tailed Pigeon**Taxonomy.** *Macropygia browni* P. L. Slater, 1877, Duke of York Island.Genus probably closest to *Macropygia*, which it resembles in shape and colour pattern of outer rectrices. Similar plumage patterns of present species and *R. reinwardtii* suggest they are quite closely related. Monotypic.**Distribution.** Admiralty Is and Bismarck Archipelago.**Descriptive notes.** 40-46 cm; 279-325 g. Similar to *R. reinwardtii*, but lacks chestnut in plumage. Forehead, crown and hindneck silvery grey becoming white on face, breast and underparts; flanks and undertail-coverts dark bluish grey; mantle, back, rump, uppertail-coverts, wings and central rectrices black; outer rectrices patterned with grey; iris red or yellow; legs and feet dark red; bill dark grey or brown with reddish base. Juvenile plumage mainly sooty grey.**Habitat.** Inhabits foothill and montane forests up to at least 1000 m in New Britain; preferably found in tall forest. Usually solitary.**Food and Feeding.** Known to eat berries.**Breeding.** No information available.**Movements.** No information available.**Status and Conservation.** Not globally threatened. Very little known about status, but species is considered to be generally uncommon. Given its apparent preference for mature forest, the deforestation that is occurring throughout the main islands of its range may be significant threat. Populations should be surveyed, and if necessary monitored; research required in order to establish basic biology and work out possible conservation needs.**Bibliography.** Beehler (1978a), Bishop (1987), Coates (1985), Dahl (1986), Gilliard & LeCroy (1967a), Gregory (1995c), Salomonsen (1972).

81. Crested Cuckoo-dove

Reinwardtoena crassirostris

French: Phasianelle huppée **German:** Helmtaube **Spanish:** Paloma Rabuda Crestada
Other common names: Crested Long-tailed Pigeon, Crested Pigeon(!)

Taxonomy. *Turacena crassirostris* Gould, 1856, Guadalcanal, Solomon Islands. Genus probably closest to *Macropygia*, which it resembles in shape and colour pattern of outer rectrices. Present species was formerly separated in monotypic genus *Coryphoenas*. Monotypic.
Distribution. Solomon Is, from Bougainville SE to San Cristobal.



Descriptive notes. 40-41 cm. Head and crest pale purplish grey; crown and nape feathers with hairy texture; throat white; sides of neck and breast bluish grey, darker on rest of underparts and hindneck; breast and underparts in some individuals washed yellowish fawn; upperparts and central rectrices black; outermost pair of rectrices greyish white on outer web, greyish at base, subterminal black bar with grey tip; rest of rectrices black with central grey band; iris yellow, surrounded by a red ring; orbital skin purple red or red; bill orange-yellow, red or purplish red at base, orange-tipped; upper mandible strongly hooked; legs

and feet red. Female similar. Juvenile lacks long crest; wings duller, feathers edged with rust; head feathers dusky, with black subterminal bars and rust-tipped.

Habitat. Forest and occasionally second growth in lowland and montane areas from sea-level up to at least 1100 m. One observer recorded it as being a species of dense scrub. Occurs singly or in pairs.

Food and Feeding. Takes fruit, including those of *Boerlagiodendron* and *Schefflera*. Generally feeds in trees, but will sometimes come to the ground to feed.

Breeding. Reported to have a clutch of 1 egg. No further details available.

Movements. Suspected of being nomadic, but no precise details available.

Status and Conservation. Not globally threatened. Very little information available, and biology virtually unknown. Species is described as being rare on Bougainville; widespread and present at many localities on Santa Isabel; and reasonably common on Kolombangara, Guadalcanal and San Cristobal. Extensive research required.

Bibliography. Buckingham *et al.* (1995), Cain & Galbraith (1956), Coates (1985), Dahl (1986), French (1957), Galbraith & Galbraith (1962), Hadden (1981), Mayr (1945a, 1945b), Schodde (1977), Webb (1992).

Genus *TURACOENA* Bonaparte, 1854

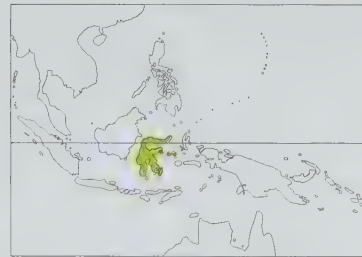
82. White-faced Cuckoo-dove

Turacoena manadensis

French: Phasianelle de Manado **German:** Manadotaube **Spanish:** Paloma Cariblanca
Other common names: White-faced Black Cuckoo-dove, Sulawesi/White-faced Black Pigeon, White-faced/White-headed(!) Pigeon

Taxonomy. *Columba manadensis* Quoy and Gaimard, 1830, Manado, Sulawesi. Genus generally regarded as being related to *Macropygia*, and indeed sometimes included within it; however, this has been questioned, and similarities in coloration noted with some members of *Columba* species, e.g. *C. vitiensis*. Closely related to *T. modesta* with which presumably forms a superspecies. Birds of Banggai and Sula Is have sometimes been awarded a separate race, *sulaensis*, as averaging very slightly smaller, but validity doubtful. Monotypic.

Distribution. Sulawesi and small islands off NE, as well as Togian Is, Muna and Butung, Banggai and Sula Is.



Descriptive notes. 36-40 cm; 172-253 g. Forehead, face and throat white; rest of plumage slaty grey; neck with green or purple iridescence and slight iridescence on coverts; iris red to purplish red, orbital skin purplish pink; bill, legs and feet black. Sexes alike. Juvenile duller than adult, face washed with grey.

Habitat. Frequents wooded gorges and patches of dense woodland in relatively open country; occurs in lowland areas, up to 800 m. Recorded singly or in pairs.

Food and Feeding. Feeds in the sub-canopy on fruits and berries, including fruits of *Lantana camara* and small orange figs; also attacks pa-

payas in gardens.

Breeding. Males collected on Butung appeared to be in breeding condition in Aug. In captivity: 1 egg; incubation 18 days; fledging 30 days.

Movements. No information.

Status and Conservation. Not globally threatened. In Sulawesi, frequent, e.g. in second growth and forest edge habitats in Dumoga-Bone National Park in 1980's; common in Lore Lindu Reserve; uncommon to locally common on Butung in mid-1990's. Relatively uncommon on Taliabu and Seho (Sula Is), where recorded in both primary and selectively logged forest. Research required.

Bibliography. Andrew (1992), van Bommel & Voous (1951), Catterall (1996), Coates & Bishop (1997), Davidson *et al.* (1994), Gibbs (1990), Holmes & Philipps (1996), Rösler (1996), Rozendaal & Dekker (1989), Stresemann (1941), Watling (1983), White & Bruce (1986).

83. Black Cuckoo-dove

Turacoena modesta

French: Phasianelle modeste **German:** Timortaupe **Spanish:** Paloma de Timor
Other common names: Slaty/Slate-coloured Cuckoo-dove, Timor Black Pigeon

Taxonomy. *Columba modesta* Temminck, 1835, Timor.

Genus generally regarded as being related to *Macropygia*, and indeed sometimes included within it; however, this has been questioned, and similarities in coloration noted with some members of *Columba* species, e.g. *C. vitiensis*. Closely related to *T. manadensis* with which presumably forms a superspecies. Monotypic.

Distribution. Timor and Wetar.



Descriptive notes. 38.5 cm. Dark bluish slate throughout, paler on head and underparts and almost black on wings and tail; crown, nape, neck, breast and upper mantle feathers fringed green or amethyst iridescence; iris with yellow inner ring and red outer ring; orbital skin yellow; feet and legs black. Sexes alike. Juvenile slate washed brown, with blackish subterminal bands and fawny white fringes to most feathers.

Habitat. Primary and tall secondary monsoon forest from lowlands up to 1100 m; also found in woodland and tall secondary growth.

Food and Feeding. Forages at medium height in bushes and small trees, sometimes in open

situations; seen alone or in twos. No further information available.

Breeding. No information available.

Movements. No information available.

Status and Conservation. **VULNERABLE.** Uncommon to rare in Timor; habitat has been much reduced and fragmented, particularly in W Timor. Recent observers have found present species to be very scarce, e.g. seen at just two localities during the course of nine-week survey of lowland forests in W Timor in 1993; others have failed to record it at all on the island, although formerly it could even be found in open woodland and open areas close to settlements. Observed in Wetar during a short visit in 1990, the first by an ornithologist since 1911; extensive forest remains on this small island.

Bibliography. Andrew (1992), Coates & Bishop (1997), Collar *et al.* (1994), Gibbs (1990), Mayr (1944b), Noske (1995), Sujatnika & Jepson (1995), Sujatnika *et al.* (1995), White & Bruce (1986).



Genus *TURTUR* Boddaert, 1783

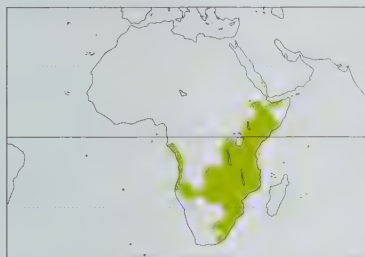
84. Emerald-spotted Wood-dove

Turtur chalcospilos

French: Tourtelette émeraude **German:** Bronzeflecktaube **Spanish:** Palomita Aliverde
Other common names: Emerald-spotted Dove, Green-spotted Wood-dove

Taxonomy. *Columba Chalcospilos* Wagler, 1827, eastern Cape Province. Forms a superspecies with *T. abyssinicus*, with which has been considered conspecific. In S Africa, W populations formerly awarded race *volkmanni*, and E ones race *zambesiensis*, but variation is clinal. Monotypic.

Distribution. SE Sudan, Ethiopia and W Somalia S through E Africa to N Namibia, N Botswana and Natal; also in coastal Gabon S to SW Angola.



Descriptive notes. 20 cm; 50–71 g. Forehead white or pale grey becoming bluish grey on crown; narrow black line from the gape to eye; sides of neck and underparts light pinkish mauve; chin and centre of belly pinkish white; upperparts light brown to greyish fawn; two large iridescent patches are conspicuous on inner side of closed wing, emerald- to golden-green, or less frequently bluish green; two horizontal blackish bands on lower back, separated by a whitish fawn band; black tips to uppertail-coverts result in 2–3 dark bands on tail base; central rectrices greyish brown with broad, poorly defined black tips; other tail feathers

bluish grey with black tips, the outermost are white on basal half of each outer web; outer webs and tips of primaries, and outer secondaries dark brown; other primaries and underwing chestnut; undertail and longest undertail-coverts black; iris brown to dark brown; legs and feet purple to purplish red; bill reddish purple at base, black distally. Sexes similar. Juvenile barred throughout buff or rufous with buff tips and dark subterminal bars; wing patches usually smaller and less iridescent. Cline in tone of plumage coloration in S of range, with paler birds in arid Namibia and darker ones S of R Limpopo.

Habitat. Frequents savanna woodland, deciduous woodland thickets, acacia savanna, lowland riparian and coastal forests, and open cultivated areas. Occurs up to 2000 m, although most numerous below 1600 m. Usually in drier habitats than closely-related *T. afer*.

Food and Feeding. Although it perches on trees, all foraging is done on ground, where species takes small seeds, herbs and grasses, and some invertebrates (e.g. molluscs, termites).

Breeding. Laying dates: Apr–Jun and Nov in Ethiopia; principally May–Jun in E Africa but with wide scatter of records to Mar and Dec; Feb–Apr and Aug–Sept in Zambia; and mainly between Jan–May and Sep–Oct in S Africa. Nest consists of a platform of twigs, rootlets and grass stems c. 10 cm in diameter, placed in a stump, bush or tree, 0.5–6 m (average c. 2 m) above ground; often placed in creepers; one ground nest, on open sand, has been documented. Usually 2 cream-coloured eggs, although 8 of 84 nests examined contained only 1 egg; incubation 13 days; nestling is pale brownish flesh with long yellowish hair-like down on head, scapulars and dorsum; fed 5 times daily; fledging 16–18 days.

Movements. Generally sedentary, although some local movements in response to weather conditions have been noted in S Africa. Flight low and direct, although birds rarely move far. No evidence of movements in Kenya.

Status and Conservation. Not globally threatened. Common to abundant throughout most of its sizeable range. Fairly catholic taste in habitat, and often found in suburbs and gardens, indicating adaptability to some man-made habitats.

Bibliography. Ash & Miskell (1983), Baker (1985), Benson & Benson (1977), Britton (1980a), Dowsett & Forbes-Watson (1993), Friedmann (1930a), Gichuki (1986), Ginn *et al.* (1989), Lewis & Pomeroy (1989), Lippens & Wille (1976), Mackworth-Præd & Grant (1957, 1962, 1970), Maclean (1993), Nikolaus (1987), Pakenham (1979), Penry (1994), Pinto (1983), Rösler (1996), Rowan (1983), Rutgers & Norris (1970), Short *et al.* (1990), Snow (1978), van Someren (1956), Urban & Brown (1971), Urban *et al.* (1986), White (1965), Zimmerman *et al.* (1996).

85. Black-billed Wood-dove

Turtur abyssinicus

French: Tourtelette d'Abyssinie **German:** Erzflecktaube **Spanish:** Palomita Saheliana
Other common names: Abyssinian/Black-billed Blue Spotted Wood-dove

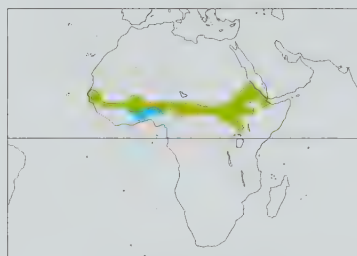
Taxonomy. *Chalcopelia abyssinica* Sharpe, 1902, Kokai, Eritrea.

Forms a superspecies with *T. chalcospilos*, with which has been considered conspecific. Monotypic. **Distribution.** S Mauritania and Senegambia to Ghana, Togo, Benin and Nigeria, and E through N Cameroon, N Central African Republic to Eritrea, Ethiopia, N Uganda and extreme NW Kenya.

Descriptive notes. 20 cm; 51–78 g. Similar in size and colour to *T. chalcospilos*, but a little lighter and greyer in overall coloration; wing-spots are dark blue and somewhat smaller; bill black. Sexes alike. Juvenile is dusky-coloured, barred buff or rufous.

Habitat. Occurs from sea-level to 1800 m, in arid habitats such as savanna woodland with *Acacia* and *Combretum*; also frequents bushes around desert wells, woods at edges of marshes and dense woodland edge; often found in cassava plantations in N Ghana. Prefers heavier woodland and forest in Ethiopia. In N part of range, with the coming of the dry season, species concentrates in thicker vegetation close to water.

Food and Feeding. Eats mostly seeds of grasses and herbs, each weighing 0.2–0.5 mg; occasionally takes much larger items, e.g. grains of *Sorghum*, *Pennisetum* and *Oryza*. Seeds of at least 63 species documented in Senegambia, with *Panicum laetum* constituting 56% of total food weight.



Breeding. Season Aug–Apr in W Africa; Sept–Oct and Jan in Sudan. Nest consists of a platform of thin sticks concealed in vegetation e.g. *Balanites*, *Acacia nilotica*, *Zizyphus mauritiana*, *Salvadora*, *Boscia* and *Maytenus*, 1–2.5 m above ground. Clutch 2 brownish cream eggs; incubation 15 days; fledging 17 days.

Movements. Resident in most of range, but possibly a partial migrant in some areas; apparent non-breeding migrants have been recorded in Togo, Benin and Nigeria south of 10° N.

Status and Conservation. Not globally threatened. Common to abundant throughout much of range, e.g. Togo, Nigeria. Density of c. 5 birds/ha recorded in riparian woodland in Senegambia. Habitat not threatened, and species appears secure. CITES III in Ghana.

Bibliography. Baillon & Benvenuti (1990), Bannerman (1951, 1953), Benvenuti *et al.* (1991), Britton (1980a), Dowsett & Forbes-Watson (1993), Elgood *et al.* (1994), Giraudoux *et al.* (1988), Gore (1990), Grimes (1987), Holman (1947), Lamarche (1980), Lewis & Pomeroy (1989), Louette (1981), Mackworth-Præd & Grant (1957, 1970), Morel, G.J. & Morel (1990), Morel, M.Y. (1980), Nikolaus (1987), Rösler (1996), Short *et al.* (1990), Smith (1957), Snow (1978), Thiollay (1985), Trollope (1978), Urban & Brown (1971), Urban *et al.* (1986).

86. Blue-spotted Wood-dove

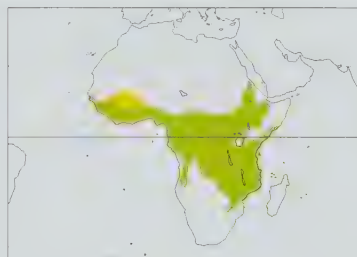
Turtur afer

French: Tourtelette améthystine **German:** Stahlflecktaube **Spanish:** Palomita Aliazul
Other common names: Red-billed/Sapphire-spotted/Metallic-spotted Wood-dove

Taxonomy. *Columba afra* Linnaeus, 1766, Senegal.

Related to *T. abyssinicus*, and often occurs sympatrically with either *T. abyssinicus* or *T. chalcospilos*. Birds of highlands of Ethiopia formerly awarded race *mearnsi*, and those of Mt Kilimanjaro zone race *kilimensis*, but neither nowadays considered valid. Monotypic.

Distribution. Senegambia through most of W & C Africa to Ethiopia and Eritrea, and S through Zaire to S Angola, SC Zambia, E Zimbabwe, S Mozambique and extreme E South Africa. Said to occur on Bioko (Fernando Póo), but this is now considered unlikely.



Descriptive notes. 22 cm; 53–74 g. Similar to *T. chalcospilos* with smaller, amethyst blue wing-spots; base of outer web of outermost rectrix pale grey, not white; bill wine red, yellow-orange at tip; bill base occasionally purplish. Sexes alike. Juvenile similar to adult but browner with upperparts tipped and barred buff, and wing-spots smaller and duller.

Habitat. Moist woodland, secondary forest and forest edge, montane forest clearings, and evergreen thickets in *Acacia* and *Combretum* savanna, up to at least 2000 m. Also occurs in gardens, farms, mangroves and *Eucalyptus* plantations. In Kenya, mainly occurs in areas

with over 1000 mm of rainfall annually.

Food and Feeding. Grass seeds comprise most of diet, but also seen feeding on castor-oil (*Ricinus*) seeds, as well as termites and small snails. All food taken on the ground. Occurs singly or in pairs, but may collect in small groups in good feeding areas.

Breeding. Nesting recorded in all months in E Africa; principally Oct–Mar/Apr, with single records in Jun and Aug, in W Africa; and Mar–Apr, Jun, Aug–Oct and Dec in S Africa. Nest is a platform, 8–20 cm in diameter, of twigs, rootlets, tendrils and woolly material; placed 1–3 m above ground, in a bush, tree or tree-stump; there are two records of this dove using old thrush nests. Clutch 2 white to creamy white eggs; incubation 13 days; fledging 13–14 days.

Movements. Resident throughout much of range. However, partial migrant in some areas, e.g. Ghana, where the species appears to move S during the dry season. Visits Mali only during the wet season.

Status and Conservation. Not globally threatened. Widespread and generally common to locally abundant, but range is particularly fragmented in S Somalia, S Kenya and Tanzania; abundant in Gambia, Sierra Leone, Togo and parts of Ethiopia; common in Ghana and Nigeria, widespread and locally common in Uganda and Malawi, and on Zanzibar and Pemba. CITES III in Ghana.

Bibliography. Bannerman (1953), Benson & Benson (1977), Britton (1980a), Brooke (1984a), Colston & Curry-Lindahl (1986), Dowsett & Forbes-Watson (1993), Elgood *et al.* (1994), Friedmann (1930a), Fry (1984), Ginn *et al.* (1989), Giraudoux *et al.* (1988), Gore (1990), Grimes (1987), Lamarche (1980), Lewis & Pomeroy (1989), Lippens & Wille (1976), Louette (1981), Mackworth-Præd & Grant (1957, 1962, 1970), Maclean (1993), Nikolaus (1987), Pakenham (1979), Pinto (1983), Rand (1949), Rowan (1983), Royston (1981), Rutgers & Norris (1970), Short *et al.* (1990), Snow (1978), Sutton (1965), Taylor & MacDonald (1978a), Urban & Brown (1971), Urban *et al.* (1986), White (1965), Zimmerman (1972), Zimmerman *et al.* (1996).

87. Tambourine Dove

Turtur tympanistria

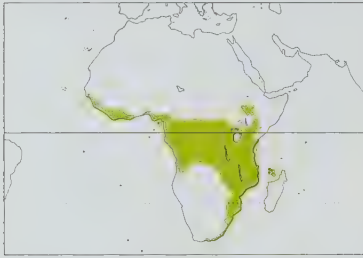
French: Tourtelette tambourette **German:** Tamburintaube **Spanish:** Palomita Tamborilera
Other common names: Forest Dove, White-breasted Pigeon, White-breasted Wood-dove

Taxonomy. *Columba Tympanistria* Temminck, 1810, South Africa.

Formerly placed in monospecific genus *Tympanistria*, as differs notably from all other *Turtur* species in coloration, and in having a sharply attenuated first primary; however, vocalizations, displays and most plumage patterns consistent with placement in genus *Turtur*. All populations N of R Cunene (S Angola) and R Zambezi formerly separated in race *fraseri*. Monotypic.

On following pages: 88. Blue-headed Wood-dove (*Turtur brehmeri*); 89. Namaqua Dove (*Oena capensis*); 90. Emerald Dove (*Chalcophaps indica*); 91. Stephan's Dove (*Chalcophaps stephani*); 92. New Guinea Bronzewing (*Henicophaps albifrons*); 93. New Britain Bronzewing (*Henicophaps foersteri*); 94. Common Bronzewing (*Phaps chalcoptera*); 95. Brush Bronzewing (*Phaps elegans*); 96. Flock Bronzewing (*Phaps histrionica*); 97. Crested Pigeon (*Ocyphaps lophotes*); 98. Spinifex Pigeon (*Geophaps plumifera*); 99. Squatter Pigeon (*Geophaps scripta*); 100. Partridge Pigeon (*Geophaps smithii*); 101. Chestnut-quilled Rock-pigeon (*Petrophassa rufipennis*); 102. White-quilled Rock-pigeon (*Petrophassa albipennis*).

Distribution. Senegambia through coastal W Africa to Ethiopia and S Somalia, and S through C & E Africa to E & S South Africa; also Bioko (Fernando Póo) and Comoro Is.



Descriptive notes. 23 cm; male 51-85 g, female 52-77 g. Forehead, area surrounding eye, throat, breast and underparts white; black band from gape to eye; upperparts dark brown with slight olive tinge; head and neck suffused grey; two horizontal blackish bands across lower back, separated by a paler band; black spots on each wing, appearing iridescent purple or dark bluish green in certain lights; underwing and most inner webs of primaries chestnut; central rectrices dark purplish brown, outer ones blue-grey with grey tips separated by darkish grey subterminal band; undertail-coverts dark brown; iris brown to dark brown; bill

reddish purple tipped dark brown to black; legs and feet purplish red. Female has male's white areas grey, darkest on neck and breast; facial areas can be whitish grey; bill varies from near black to reddish purple. Juvenile has most feathers barred rufous and blackish; underparts freckled grey and centre of belly white.

Habitat. Typically found in deep forest, in montane, lowland and riparian areas, as well as gallery and secondary forest, from sea-level to moderate elevations, reaching as high as 3000 m in Kenya and 3200 m in Ethiopia. Also occurs at forest edge of both primary and secondary forest, in addition to gardens and plantations. In Kenya, occurs mainly in areas with 500-1000 mm rainfall annually. In Cape Province (South Africa), occupies scrubby habitat with coastal dunes and riparian thickets. In Sierra Leone, commonest in open forest, clearings and mountain galleries, though also occurs in derived savannas of far N.

Food and Feeding. Known to feed on a variety of seeds, including those of castor-oil (*Ricinus*), *Sorghum*, *Eleusine*, *Albizia*, *Celtis*, *Croton* and *Neoboutonia*, as well as mulberries, fruits of 2 species of *Solanum*, *Syzygium* and pigeon wood (*Trema orientalis*); also takes small invertebrates, e.g. termites and small molluscs. Mostly forages on the forest floor, usually beneath leafy cover, but *Trema* berries are plucked from trees. Occurs singly or in pairs, rarely up to 6 together; occasionally consorts with *Columba larvata*.

Breeding. Nests recorded in all months, with local variations; in South Africa, Sept-May, during all but the three coldest months of the year. Pairs disperse while breeding, each territory covering at least 2-3 ha. Nest is platform, 9 cm in diameter, of thin sticks and rootlets, usually placed close to the trunk of a tree or bush, or in a tangle of creepers; 16 nests examined were placed 1-10 m above the ground (average 2.5 m); one nest found in fallen tree in mangrove swamp, and 1 pair used old nest of *Streptopelia senegalensis*. Adults share nest-building; female takes most of incubation. Usually 2 creamy white eggs, occasionally 1; incubation 17-20 days; young fed 4 times daily; fledging 13-22 days, though can fly quite strongly at 14 days.

Movements. Mainly sedentary through much of range. However, ringing studies at Mtunzini, Natal, revealed an influx of birds in Jul-Aug, suggesting some local winter movements, or movements in response to changing food supplies. Flight quiet, fast and direct.

Status and Conservation. Not globally threatened. Widespread and locally common; common in Ghana and Nigeria; a census in Malawi yielded 20 pairs in 40 ha of forest. In South Africa, numbers seem to be increasing in response to an increase in castor-oil plantations. In other parts of its range, likely to be affected to some extent by forest destruction. CITES III in Ghana.

Bibliography. Ash & Miskell (1983), Bannerman (1953), Baptista (1996), Benson (1960), Benson & Benson (1977), Brickell (1984b), Britton (1980a), Colston & Curry-Lindahl (1986), Dowsett & Forbes-Watson (1993), Dupuy (1975), Elgood *et al.* (1994), Friedmann (1930a), Fry (1984, 1986), Ginn *et al.* (1989), Grimes (1987), Hänsel (1981), Hofmeyr (1991), Lewis & Pomeroy (1989), Lippens & Wille (1976), Louette (1981), Mackworth-Praed & Grant (1957, 1962, 1970), Maclean (1993), Martin *et al.* (1992), Nicolai (1969), Nikolaus (1987), Pakenham (1979), Pérez del Val (1996), Pinto (1983), Rowan (1983), Rutgers & Norris (1970), Short *et al.* (1990), Snow (1978), van Someren (1956), Trollope (1996), Tye (1992), Urban *et al.* (1986), Vincent (1946), Zimmerman (1972), Zimmerman *et al.* (1996).

88. Blue-headed Wood-dove

Turtur brehmeri

French: Tourtelette demoiselle **German:** Blaukopftaube **Spanish:** Palomita Cabeciazul
Other common names: Maiden/Blue-headed Dove

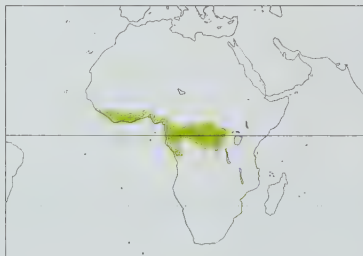
Taxonomy. *Chalcopelia Brehmeri* Hartlaub, 1865, Gabon.

Rather different plumage from congeners, and formerly at times placed in monospecific genus *Calopelia*. Two subspecies recognized.

Subspecies and Distribution.

T. b. infelix J. L. Peters, 1937 - coastal Guinea and Sierra Leone E to coastal Cameroon, extending inland along rivers as much as 130 km.

T. b. brehmeri (Hartlaub, 1865) - S Cameroon E through N Congo to Rift Valley in E Zaire, and S to extreme NW Angola.



Descriptive notes. 25 cm; male 131-135 g, female 92-132 g. Dark chestnut brown throughout, the mantle, neck and wing-coverts strongly tinged reddish purple, purple tinge is less pronounced on rump and tail and reduced or absent in underparts; 2-6 iridescent golden-bronze or golden-copper spots on folded wing; primaries; outer rectrices blue-grey with chestnut terminal bands separated by black subterminal band; two paler chestnut horizontal bands bordered with bluish brown across lower back; forehead and forecrown bright greyish blue becoming darker on hindcrown and nape; dark purple stripe from gape to eye; underwing

chestnut, primaries tinged black; iris dark brown tinged chestnut; bill dark purple basally becoming green distally; legs and feet purplish red or pinkish purple. Sexes similar. Juvenile indistinctly barred chestnut brown and black, and with cinnamon brown face, forehead and chin. Race *infelix* differs in having 2-6 iridescent green wing-spots, no or almost no banding on lower back, and less of a vinous sheen to upperparts and foreneck.

Habitat. Lowland primary forest and old second growth up to at least 750 m. Avoids cultivated areas and heavily disturbed forest. Occasionally uses gardens, provided there is forest nearby.

Food and Feeding. Feeds on seeds, insects and their larvae, and slugs. Forages among leaves on forest floor. Often perches in understorey, within 3 m of the ground. Usually solitary or in pairs; only rarely in small parties.

Breeding. Laying in Jan in Sierra Leone; Aug in Cameroon; Dec-May in Gabon; and Jul-Oct in Zaire. Nest is a cup (15 x 20 cm in diameter) of small twigs and roots, on a base of dried dead leaves; placed on horizontal branch 2.5-5.5 m above ground in leafy undergrowth. Clutch, 1-2 eggs, cream or dark buff with an olive gloss; young fed by both parents; fledging 14 days.

Movements. Sedentary. Flight fast and direct.

Status and Conservation. Not globally threatened. Ranges from common to frequent, uncommon or rare in different parts of its distribution; rather shy and probably frequently overlooked. Common in Sierra Leone; uncommon in Ghana, where has probably declined since early part of century; uncommon in Nigeria; rare in Togo. Requirement for essentially undisturbed forest indicates that deforestation is liable to be a threat in some areas, but no relevant details available at present. CITES III in Ghana.

Bibliography. Brosset (1976a), Colston & Curry-Lindahl (1986), Demey & Fishpool (1994), Dowsett & Forbes-Watson (1993), Elgood *et al.* (1994), Farmer (1979), Fry (1984), Gatter (1988), Green (1984), Grimes (1987), Holman (1947), Lippens & Wille (1976), Louette (1981), Mackworth-Praed & Grant (1970), Pinto (1983), Reinkemeier (1973, 1974), Rösler (1996), Serle (1957), Snow (1978), Thiollay (1985), Thomas (1991), Urban *et al.* (1986).

Genus *OENA* Swainson, 1837

89. Namaqua Dove

Oena capensis

French: Tourtelette masquée **German:** Kaptäubchen **Spanish:** Tortolita Rabilarga
Other common names: Cape/Long-tailed Dove

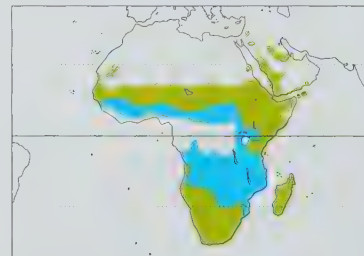
Taxonomy. *Columba capensis* Linnaeus, 1766, Cape of Good Hope.

Related to members of genus *Turtur* with which it shares plumage characters and a vocalization. Racial variation questionably valid. Two subspecies recognized.

Subspecies and Distribution.

O. c. capensis (Linnaeus, 1766) - sub-Saharan Africa, Socotra and Arabia; recently established in Israel.

O. c. aliena Bangs, 1918 - Madagascar.



Descriptive notes. 28 cm; 28-54 g. Forehead, face, throat and front of breast black with narrow greyish white border; rest of head, sides of neck and breast, and most wing-coverts bluish grey; hindneck, mantle, inner wing-coverts, scapulars and inner secondaries light fawn to brown; 2-5 iridescent purple or dark blue spots on wings; primaries chestnut with black tips, outer webs edged black; back and rump dull drab brownish, lower back with horizontal pale band bordered by two black bands; upperpart-coverts brownish grey to grey with black tips forming bar across tail; underwing black and chestnut; long central tail feathers

dull silver grey at base becoming black towards tip; outer tail feathers blue grey with black subterminal bars, the outermost pair with white outer webs; undertail black; iris dark brown surrounded by purplish grey to grey orbital skin; bill varies from purple-red to orange-red at the base, with orange to orange-yellow tip; legs and feet purplish red. Female has colour pattern similar to *Turtur afer*, *T. abyssinicus* and *T. chalcospilos*; lacks black mask, having greyish white face and drab greyish head, neck and breast; black line from gape to eye; outer wing-coverts duller than the male and bill is purplish black. Juvenile has most body coverts with blackish subterminal bars and yellowish fawn to white tips giving speckled appearance; primaries have chestnut tips; some juvenile males have blackish breast feathers with fawn tips. Race *aliena* smaller, darker and greyer.

Habitat. Open areas such as *Acacia* savanna and thornfield, notably in sandy areas; also grassland with bushes, open areas in riparian situations and cultivated areas; avoids forest. Found in tropical and subtropical lowlands, up to c. 1600 m; transients recorded up to 3000 m in Kenya; in Madagascar, occupies lowlands up to 1500 m.

Food and Feeding. Mainly small grass and herb seeds, often wind-borne; total of 68 species of seeds identified in diet, including those of 10 grasses and 8 sedges; seedling species eaten include *Panicum miliaceum*, *Poa abyssinica*, *Pennisetum typhoides* and *Eleusine*; small wind-borne seeds include *Panicum laetum* and *Eragrostis pilosa*; 50-90% of diet consists of seeds of monocotyledons (80% of *Panicum*); most seeds consumed weigh less than 1 mg, many 0.1-0.5 mg. Rarely takes invertebrates such as insects and snails; some taken from cowpats and horse dung. Occurs singly, in pairs and, on some occasions, in flocks of 100's or 1000's near water or good food sources; in Madagascar, forms flocks of up to 20 near areas of food abundance.

Breeding. All year round in most areas, but in E Africa peaks in dry season or late rainy season; in Arabia, nest building in Mar, eggs by May and young in Jun; in Israel, eggs from mid-May; only recorded Sept-Mar in Madagascar. Nest is small platform (5.5-8.5 cm in diameter) of interlaced small twigs, rootlets and tendrils with lining of grass; some nests constructed entirely of grass; most frequently situated in low bushes (*Acacia* or *Tamarix*) 1.5-5 m (average 3 m) above ground, but sometimes close to the ground or even on it (4% of nests); a few nests in reeds or grass tufts. Almost always 2 eggs (1-3), and one clutch of 4 eggs probably laid by 2 females; eggs pale yellow to buff; incubation 13-16 days, by both adults; fledging 16 days. Among nests studied in Israel, there was almost 100% breeding success, although this newly established breeding zone may well not be typical for the species as a whole.

Movements. Some populations sedentary, but there are seasonal and perhaps even nomadic movements in some areas. Some populations are highly migratory; populations of Israel, some of Arabia and probably those of SE Egypt mostly move S to winter; in Israel, arrives mid-Mar, most birds moving S to winter in Sep-Oct. Nomadic in Nigeria and elsewhere in W Africa, where present throughout most of year in Sahel, but migrates S to breed in Sept-Apr; in Sudan most birds move N to breed during rainy season. Populations of Zanzibar make daily trips to mainland during dry season. Vagrant to Sierra Leone, Burundi, Canary Is, Jordan, E Arabian Peninsula, and doubtfully Syria. See page 98.

Status and Conservation. Not globally threatened. Widespread and common to locally abundant throughout much of its extensive range. Populations in Israel and Arabia have been increasing and expanding their range since mid-1970's; first seen Israel in 1961, and now breeds at Eilat and along Wadi 'Araba; E Arabian Peninsula may be in process of being colonized by breeding birds. In Madagascar, mostly found on N, S & W of island, but spreading on High Plateau and to E. CITES III in Ghana.

Bibliography. Ash & Miskell (1983), Bannerman (1953), Baptista (1996), Benson & Benson (1977), Benson *et al.* (1976-1977), Bowen (1983b), Britton (1980a), Chapin (1939), Cramp (1985), Dowsett & Forbes-Watson (1993), Elgood *et al.* (1994), Evans, M.I. (1994), Friedmann (1930a), Fry (1984), Ginn *et al.* (1989), Giraudeau *et al.* (1988), Goodman *et al.* (1989), Gore (1990), Grimes (1987), Harrison (1982a), Hoffman (1969), Jennings (1977, 1978, 1981a, 1995), Kirwan *et al.* (1996), Knight (1989), Langrand (1990), Lewis & Pomeroy (1989), Lippens & Wille (1976), Louette (1981), Mackworth-Praed & Grant (1957, 1962, 1970), Maclean (1993), Milon *et al.* (1973), Mindell (1986/87), Morel (1980), Nikolaus (1987), Paz (1987), Penry (1994), Pinto (1983), Porter *et al.* (1996), Rösler (1996), Rowan (1983), Rutgers & Norris (1970), Shirihai (1996), Shirihai & Gellert (1989), Short *et al.* (1990), Snow (1978), Urban *et al.* (1986), Zimmerman *et al.* (1996).

Genus *CHALCOPHAPS* Gould, 1843

90. Emerald Dove

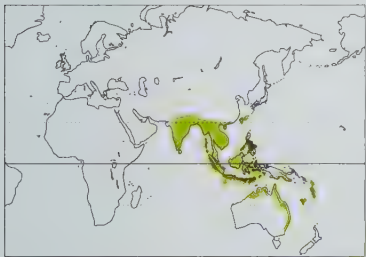
Chalcophaps indica

French: Colombine turvert **German:** Glanzkäfertaube **Spanish:** Palomita Esmeralda Dorsiverde
Other common names: Green-winged/Green-backed/Green Dove, Lilac-mantled/Long-billed/Little Green/Little Green-winged Pigeon

Taxonomy. *Columba indica* Linnaeus, 1758. Ambon.
Genus shows affinities to both Australian bronzewings (*Phaps* and allies) and African spotwinged doves (*Turtur*). Present species closely related to *C. stephani*, with which largely allopatric; distributions suggest that present species may be expanding its range at the expense of *C. stephani*, for example in Moluccas and W Papuan Is. Race *chrysochlora* may merit treatment as separate species (incorporating *longirostris* and *sandwichensis*). Many races described, some based on very minor differences. May include *C. norfolciensis*, a name long used for *Columba leucomela* but now known to refer to a species of *Chalcophaps* that formerly occurred on Norfolk I. Nine subspecies tentatively recognized.

Subspecies and Distribution.

- C. i. indica* (Linnaeus, 1758) - Indian Subcontinent (S from Himalayan foothills), S China (SE Sichuan, Yunnan, Guangxi, Hainan), Taiwan and S Ryukyu Is, S through SE Asia and Philippines to Greater and Lesser Sundas (E to Alor), Sulawesi, Moluccas and W Papuan Is.
- C. i. robinsoni* Stuart Baker, 1928 - Sri Lanka.
- C. i. natalis* Lister, 1889 - Christmas I (Indian Ocean).
- C. i. minima* Hartert, 1931 - Numfoor, Biak and Mios Num Is in Geelvink Bay, Irian Jaya.
- C. i. maxima* Hartert, 1931 - Andaman Is.
- C. i. augusta* Bonaparte, 1855 - Nicobar Is.
- C. i. chrysochlora* (Wagler, 1827) - E Lesser Sundas, from Wetar and Timor E to Tanimbar Is and N to Banda and Kai Is (E Moluccas), and New Guinea E from Astrolabe Bay in N and Hall Sound in S to D'Entrecasteaux and Trobriand Is and Louisiade Archipelago, then on to E Australia (S to Victoria, and ranging to SW Australia); also Lord Howe I and Norfolk I, where perhaps introduced.
- C. i. longirostris* Gould, 1848 - N Australia, in N Western Australia (Kimberley region) and Northern Territory.
- C. i. sandwichensis* E. P. Ramsay, 1878 - Santa Cruz Is, Banks Is and Vanuatu, and New Caledonia.



and uppertail-coverts grey, feathers tipped black; central tail feathers greyish black, outer ones blue-grey with broad black or purplish subterminal bands and pale grey tips; bill orange-red or red, with purplish base; legs and feet red or pinkish. Female similar, but rufous or chestnut brown where male is purplish; lacks white shoulder patch; white and grey on head restricted to front of forehead and stripe over eye. Juvenile predominantly red-brown with blackish bars and much reduced iridescence on mantle and wings; adult plumage soon acquired. Races differ on coloration and size: in *chrysochlora* group (*chrysochlora*, *longirostris* and *sandwichensis*), male has head, neck, and underparts purplish brown; little or no grey on head in *chrysochlora*, some blue-grey on crown and nape in *longirostris*; mantle, scapulars, wing-coverts and inner secondaries iridescent green with prominent white patch on bend of wing; lower back and uppertail-coverts blackish with two grey bands across lower back; tail blackish; underside of wing russet brown; bill red or orange, legs and feet purplish. Female similar but head, neck and underparts duller rufous, without purplish tinge; rump and tail dusky brown, not blackish; only a small grey area at bend of wing; bill orange.

Habitat. Wide variety of forest types and adjacent habitats, including primary rain forest, wet sclerophyll forest, mangroves, gallery forest, clearings, and agricultural country, including orchards and plantations near forests. In Australia, recorded seasonally in drier habitats, including coastal *Eucalyptus* and *Acacia* thickets. Appears to be primarily a bird of forest edge and occurs mainly in lowlands and foothills, up to 1300 m in New Guinea and to 1450 m in SE Asia and Sumatra.

Food and Feeding. Primarily seeds and fallen fruits, with some invertebrates (insects, including termites, and snails); wide variety of plant families consumed, including Arecaceae, Cyperaceae, Lauraceae, Fabaceae, Phytolaccaceae, and Solanaceae. Occasionally frequents farmyards where it will feed with domestic fowl and swine. Mainly feeds on the ground, occasionally in trees; feeds alone or in pairs; walks and runs nimbly.

Breeding. Breeds throughout the year in many areas, often with peak from late dry season through wet season. Nest is a slight platform of twigs, placed in tree, bush, vines, epiphytic fern or tree-fern, but also in oil palm plantations; placed 1-5 m up. Lays 2 cream-coloured or buffish eggs. In captivity: incubation 14-16 days; young semi-altricial, nidicolous and covered with sparse yellow down at hatching; at 7-8 days, wings completely feathered, though plumes only beginning to break from sheaths, and head, neck and back bare; fledging 12-16 days. In captivity, chicks leave nest and able to fly by c. 21 days old.

Movements. Apparently sedentary or locally nomadic in most parts of its range, e.g. in Northern Territory (Australia) common in Jun but few or none in Dec. However, capable of long-distance flights, as evidenced by numerous records at sea far from land and two cases from 1970's of birds ringed in W Malaysia being recovered in Sumatra. When flushed, flies swiftly and low. Colonized Norfolk I "naturally", with first record in 1908; also possibly Lord Howe I, where definitely recorded in 1869, but possibly the result of an introduction. Other introductions attempted: in Hawaii, in 1924, unsuccessful; in Hong Kong, where successfully established; and in New Zealand in 1867, but birds not liberated. Recent possible record from Maldives Is.

Status and Conservation. Not globally threatened. The only population estimate is for race *natalis* on Christmas I, where c. 1000 pairs remain. Adapts readily to secondary forest and edges, and is widespread and common (though inconspicuous) in many areas, e.g. Borneo, Sumatra and Vanuatu. However, declines have been noted in some populations e.g. in Java, Bali, SE Queensland (Australia) and Norfolk I. Threats include predation by rats and feral cats; species is occasionally hunted for food by humans, especially on islands; in Vanuatu, open season for hunting is Apr-Jun inclusive.

Bibliography. Abdullali (1978), Ali (1996), Ali & Ripley (1981), Baker (1913), Beehler *et al.* (1986), Brazil (1991), Bregulla (1992), Coates (1985), Coates & Bishop (1997), Deignan (1945), Dickinson *et al.* (1991), Disney & Smithers (1972), Échécopar & Hüe (1978), Frith (1982), Hellebrekers & Hoogerwerf (1967), Higgins & Davies (1996), Inskipp & Inskipp (1991), Lekagul & Round (1991), Lever (1987), MacKinnon & Phillipps (1993), Madoc (1976), Majumdar *et al.* (1992), van Marle & Voous (1988), Mayr & Rand (1937), Medway & Wells (1976), Mukherjee (1960), Mukherjee & Dasgupta (1975), Phillips (1978), Pire (1992), Rabor (1977), Rand & Rabor (1960), Ripley (1982), Rutgers & Norris (1970), Schodde *et al.* (1983), Smythies (1981, 1986), Stepanyan (1995), Tikader (1984), White & Bruce (1986), Yang Lan *et al.* (1995).

91. Stephan's Dove

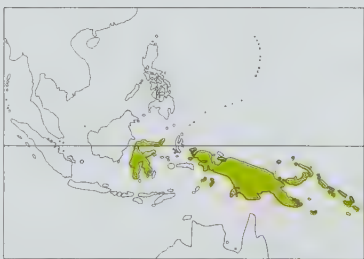
Chalcophaps stephani

French: Colombine d'Étienne **German:** Stepantaube **Spanish:** Palomita Esmeralda Dorsiparda
Other common names: Brown-backed Emerald/Brown-backed Green-winged Dove

Taxonomy. *Chalcophaps stephani* Pucheran, 1853. Triton Bay, New Guinea.
Genus shows affinities to both Australian bronzewings (*Phaps* and allies) and African spotwinged doves (*Turtur*). Present species closely related to *C. indica*. Validity of race *wallacei* has been queried, but appears to be valid. Three subspecies recognized.

Subspecies and Distribution.

- C. s. wallacei* Brüggemann, 1877 - Sulawesi and Sula Is (Taliabu).
- C. s. stephani* Pucheran, 1853 - Kai, Aru and W Papuan Is through New Guinea (with Yapen I and Karkar I) to Bismarck Archipelago (including Admiralty and Lihir Is) and D'Entrecasteaux Is.
- C. s. mortoni* E. P. Ramsay, 1882 - Solomon Is (Bougainville to San Cristobal and Santa Ana).



Descriptive notes. 24-25 cm; 118-126 g. Similar to *C. indica*, but marginally smaller, with more rounded tail. General coloration chestnut brown, darkest on the scapulars and central rectrices; crown and nape with bluish purple iridescence, back and sides of neck a reddish purple sheen; forehead pure white, sharply demarcated from chestnut brown crown and neck; most wing-coverts and some inner secondaries iridescent emerald or bronzy green; outermost rectrices grey, sometimes chestnut on inner web and grey outer web tipped chestnut with a black subterminal bar; other rectrices entirely chestnut with black subterminal bar;

lower back blackish brown crossed by two buffish bands; underwing chestnut; iris dark brown; bill orange or red; legs and feet purplish red. Female has forehead grey with less iridescence on head and neck, which are browner. Juvenile has reduced areas of iridescence on mantle and wings, body plumage barred with black. Races differ mainly in plumage: *wallacei* darker below, pale band on rump rustier; grey-violet gloss on sides of head and breast.

Habitat. Inhabits humid evergreen forest interior and dry secondary coastal forest in Sulawesi. However, in New Guinea occupies forest edge and secondary growth, in lowlands up to 700 m, locally to 1200 m, but occurring principally near sea-level. On Taliabu, uses selectively logged and heavily degraded forest. May occur sympatrically with *C. indica* in some places e.g. Kai Is, in which case the two forms separate out ecologically: present species occurs only in the forest interior, whereas *C. indica* occupies edge, more open habitat and secondary growth. Near L Kutubu (EC New Guinea), at 750-820 m, present species encounters *Gallicolumba jobiensis*: in this case, it occupies edge and secondary growth, whereas *G. jobiensis* inhabits the forest interior.

Food and Feeding. Spends much time on the ground, taking seeds, fallen fruit and probably insects. Sometimes visits the ground beneath nesting colonies of Metallic Starlings (*Aplonis metallicus*), where feeds on seeds of digested fruit dropped by the starlings. Usually observed singly, sometimes in pairs or in small groups at reliable food sources.

Breeding. Season not known; 1 dated nest mid-July. Nest of twigs resting on an accumulation of dead leaves and debris; usually near ground level; one nest placed on a fern was 1 m above ground, but another in E Highlands of New Guinea was c. 10 m up in a tree fork. Clutch 2 cream-coloured or non-glossy yellowish eggs.

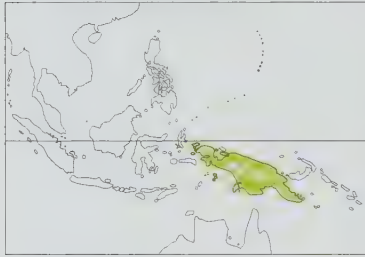
Movements. Known to be locally nomadic in habitat with seasonally dry climatic conditions. Probably also wanders in response to changing food conditions. A carcass was recovered from ice on the Carstenz Massif, Irian Jaya, well beyond its normal altitudinal range, suggesting more extensive wanderings.

Status and Conservation. Not globally threatened. Few precise data available; widespread but local throughout New Guinea. Particularly numerous on islands in Bismarck Archipelago.

Bibliography. Andrew (1992), Andrew & Holmes (1990), Beehler (1978b), Beehler *et al.* (1986), Blaber (1990), Cain & Galbraith (1956), Coates (1985), Coates & Bishop (1997), Diamond (1972a), Gibbs (1990), Gregory (1995c), Hadden (1981), Holmes & Phillipps (1996), Mayr (1945b), Meyer (1930, 1933), Rand & Gilliard (1967), Ripley (1964), Rösler (1996), Rozendaal & Dekker (1989), Schodde & Hitchcock (1968), Sibley (1951), Stresemann (1941), Watling (1983), White & Bruce (1986).

Genus *HENICOPHAPS* G. R. Gray, 1862

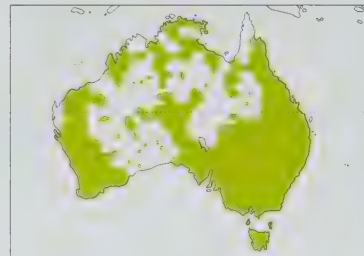
92. New Guinea Bronzewing

*Henicophaps albigrons***French:** Colombine à front blanc**Spanish:** Paloma-bronce Frentiblanca**German:** Weißstirntaube**Other common names:** Black/White-capped/Long-billed Bronzewing, White-capped Ground Pigeon, Jungle Bronzewing Pigeon**Taxonomy.** *Henicophaps albigrons* G. R. Gray, 1862, Waigeo.Distinctive genus belonging to the large radiation of bronzewings; may be most closely allied to *Chalcophaps*. Present species forms a superspecies with *H. foersteri*. Two subspecies recognized.**Subspecies and Distribution.***H. a. albigrons* G. R. Gray, 1862 - W Papuan Is (Waigeo, Salawati, Misool), New Guinea and Yapen I.
H. a. schlegeli (Rosenberg, 1866) - Aru Is.**Descriptive notes.** 36-41 cm; 247 g. A stocky pigeon with an unusually long, heavy bill. General coloration sooty grey, sooty purple and blackish; forecrown white; iridescent patches on wing-coverts and inner secondaries vary from gold to bronzy green or blue; lesser wing-coverts (where not iridescent) dark purplish red; undertail-coverts chestnut; bill brown, feet and legs red. Sexes similar, but female slightly smaller, with forehead buffy rather than pure white. Juvenile is similar to adult but forecrown grey or brownish and the iridescent wing patches are much reduced in size. Race *schlegeli* rather similar to nominate.**Habitat.** Rain forest and monsoon forest; sometimes also teak plantations and at forest edge. Occurs in lowlands up to 1200 m, rarely to 2150 m.**Food and Feeding.** Takes fallen fruits, grubs and insects. Uses its unusually long, heavy bill to probe into moist ground and into large fruits. Feeds primarily on the ground, but also feeds on arboreal fruits. Usually encountered singly or in pairs.**Breeding.** Nesting behaviour undescribed. Based on observations of juveniles and anatomical evidence from specimens, breeding appears to take place at least during dry season and early wet season.**Movements.** Little information. May be nomadic. Flight is strong and surprisingly silent, even when species is flushed from the ground; sometimes seen in powerful direct flight above the canopy, suggesting possibility of some long-range movements.**Status and Conservation.** Not globally threatened. Currently considered near-threatened. Widely distributed but generally scarce and is probably rare in both E & NE highlands of Papua New Guinea. May still be fairly common locally.**Bibliography.** Andrew (1992), Anon. (1994a), Beehler (1978b), Beehler *et al.* (1986), Coates (1985), Collar *et al.* (1994), Diamond (1972a), Gregory (1995a, 1995b), Mayr & Rand (1937), Ogilvie-Grant (1915), Rand (1942a), Rand & Gilliard (1967), Ripley (1964), Rutgers & Norris (1970), Schmid (1993).

93. New Britain Bronzewing

*Henicophaps foersteri***French:** Colombine de Nouvelle-Bretagne**Spanish:** Paloma-bronce de Nueva Bretaña**German:** Rotscheiteltaube**Taxonomy.** *Henicophaps foersteri* Rothschild and Hartert, 1906, Massawa, New Britain.Distinctive genus belonging to the large radiation of bronzewings; may be most closely allied to *Chalcophaps*. Present species forms a superspecies with *H. albigrons*. Monotypic.**Distribution.** S Bismarck Archipelago, on Umboi, New Britain and nearby Lolobau.**Descriptive notes.** 38 cm. Forehead buffy, merging with rufous of crown, hindneck, upper mantle and sides of breast; rest of mantle, wings and tail sooty grey to purple; throat to auriculars whitish buff; remainder of underparts buff; bill blackish brown; legs and feet red. Sexes similar, but female has underparts tinged rusty brown; smaller bill.**Habitat.** Forests in the lowlands, hills and lower mountains.**Food and Feeding.** No information on diet. Reported to feed principally on the ground, and presumably has feeding methods similar to those of *H. albigrons*.**Breeding.** Local people report that nests are placed low in a shrub or small tree, and that 2 eggs are laid. **Movements.** No information.**Status and Conservation.** Not globally threatened. Currently considered near-threatened. Almost no information on status but even in the early years of 20th century, at the time of its discovery, it was regarded as rare. Biology virtually unknown; extensive research required.**Bibliography.** Coates (1985), Collar *et al.* (1994), Dahl (1986), Diamond (1976), Hartert (1926a).Genus *PHAPS* Selby, 1835

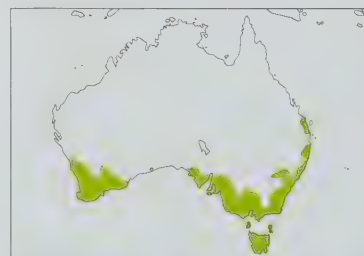
94. Common Bronzewing

*Phaps chalcoptera***French:** Colombine lumachelle**German:** Bronzeflügeltaube**Spanish:** Paloma-bronce Común**Other common names:** Bronze/Bronzewing/Common Bronzewing/Brown Pigeon, Forest/Scrub Bronzewing**Taxonomy.** *Columba chalcoptera* Latham, 1790, Norfolk Island; error = Sydney, New South Wales. Genus belongs to the large radiation of Australian bronzewings, which also includes genera *Ocyphaps*, *Geophaps* and *Petrophassa*, and, more distantly, *Chalcophaps* and *Henicophaps*. Present species closely allied with *P. elegans*. Plumage varies throughout range, but apparently clinally. Monotypic.**Distribution.** Australia and Tasmania.**Descriptive notes.** 28-36 cm; male 331-356 g, female 310-333 g. Forehead buff, bordered by dark purple stripe across front of mid-crown which curves back at sides of crown and extends to nape; rest of crown, nape and hindneck brown; short white line extends from bill to rear of eye; lores dark brown, bordered below by white cheek-stripe from base of bill, curving around the grey ear-coverts; chin and upper throat white; blue-grey band along sides of neck, grading into pink-brown of lower throat and underparts; upperparts olive-brown, broadly scaled buff; undertail dull brown in centre; otherwise blue-grey, with broad blackish

ish subterminal band and broad pale tip; upperwing dark olive-brown with varying green, yellow, bronze or purple iridescent spots, and buff or blue-grey barring and fringing to inner secondaries and most secondary-coverts; iridescence can appear black in poor light; breast and flanks pink-brown; rest of underparts blue-grey; bill blackish brown; legs and feet dull pink-red to red. Female similar but duller, lacking buff forehead patch; less iridescence on upperwing; breast dull red-brown. Juvenile male similar to adult male, but duller and forehead has buff mixed with grey, no blue-grey on sides of neck, upperparts paler brown scaled paler buff, and little or no iridescence on upperwing; juvenile female similar to juvenile male but forehead grey.

Habitat. Found in almost all wooded habitats, except the densest and wettest rain forests. Common in coastal heaths, various types of arid scrub, including mulga, mallee and others, and all varieties of sclerophyll forest; also found in salt-bush plains and open grassland where some shrubs and trees persist. Often in modified habitats, including farmland, gardens and along roadsides.**Food and Feeding.** Diet almost entirely made up of seeds, with small amounts of leafy material and occasional insects. In agricultural districts, wheat grains and exotic weed seeds are major food items, along with some native herbs and shrubs, e.g. *Acacia*, *Cassia*. In arid areas with little agriculture, *Acacia* (Fabaceae) is the most important food source; other important families include Rutaceae, Asteraceae and Poaceae.**Breeding.** Occurs all year round, with regular peak in late spring and early summer; unlike other Australian pigeons of the arid zone, breeding is unaffected by rainfall. Nest varies from flimsy platform of twigs to substantial structure up to 10 cm thick; most nests 4 m or less above ground; sites diverse, including horizontal forks, vine tangles, abandoned bird and mammal nests, and the tops of stumps. Lays 2 glossy cream-coloured eggs; incubation 14-16 days; hatchling weighs 8-9 g, and is covered with sand-coloured down; fledging period apparently unrecorded; iridescent wing-patches begin to appear at 28 days, and post-juvenile primary moult commences at c. 50 days.**Movements.** Apparently sedentary, though 1 bird was recovered 360 km from where it was ringed. Most local changes in numbers governed by food availability. Recorded as an accidental on Magnetic I (off CE Queensland). Flight is swift with continuous wingbeats.**Status and Conservation.** Not globally threatened. Widespread and abundant in many areas, including Queensland, New South Wales and much of South Australia and Northern Territory. More sparsely recorded in Western Australia, particularly on Nullarbor Plain and in large desert regions. Occurs throughout Tasmania. Attempted introduction to New Zealand in period 1864-1884 failed, although species did become briefly established around Canterbury, South I.**Bibliography.** Adams (1979), Blakers *et al.* (1984), Frith (1982), Frith, Brown & Barker (1974), Frith, Carpenter & Braithwaite (1976), Higgins & Davies (1996), Lindsey, T.R. (1977, 1992), Keast (1961), Macdonald (1988), Newman (1929), Pizzey & Doyle (1980), Rutgers & Norris (1970), Schodde & Tidemann (1986), Simpson & Day (1996), Trounson & Trounson (1987).

95. Brush Bronzewing

*Phaps elegans***French:** Colombine élégante**German:** Buschtaube**Spanish:** Paloma-bronce Elegante**Other common names:** Little Bronze, Box-poison/Brown Bronzewing Pigeon**Taxonomy.** *Columba Elegans* Temminck, 1810, D'Entrecasteaux Channel, Tasmania.Genus belongs to the large radiation of Australian bronzewings, which also includes genera *Ocyphaps*, *Geophaps* and *Petrophassa*, and, more distantly, *Chalcophaps* and *Henicophaps*. Present species closely related to *P. chalcoptera*. Subspecific arrangement tentative, and further work needed to clarify the significance of observed variation. Two subspecies currently recognized.**Subspecies and Distribution.***P. e. occidentalis* Schodde, 1989 - SW Western Australia from Dongara to vicinity of Point Culver.
P. e. elegans (Temminck, 1810) - SE Queensland (Fraser I) S to SC South Australia (Eyre Peninsula) and Tasmania.**Descriptive notes.** 25-33 cm; male 170-260 g, female 140-235 g. Head, sides of neck and lower throat blue-grey with rufous brown to light brown forehead and forecrown; dark brown lores, continuous with dark maroon eyestripes which join on nape, then grade evenly to red-brown on lower hindneck; buff cheek-stripe extends from bill, below eye, then curves over auriculars; pale chin; maroon patch on upper throat; uneven maroon stripe on sides of neck, separating hindneck from underparts; upper mantle red-brown, becoming uniform brown on rest of upperparts; uppertail brown with reddish tinge, dark subterminal band and

pale tips on all but central rectrices; primaries, primary-coverts and secondaries dark brown with green or purple sheen on outer secondaries and large iridescent purple or green patches on inner secondaries; secondary coverts rufous brown with varying oval iridescent patch and subterminal

bands of black, white and blue-grey on median and greater coverts; folded wing appears rufous brown, boldly barred blue-grey and black, and with iridescent patches of green, bronze or purple that vary with angle and intensity of light; underparts mainly blue-grey; red-brown extends from mantle onto sides of breast near bend of wing; bill blackish brown; feet and legs red. Female similar, but duller; forecap paler and smaller; eyestripe red-brown, not maroon; patch on throat paler and more mottled; upperparts lack red tones on hindneck and mantle; underparts lack blue tones and belly is paler; legs and feet paler; pink to light red. Juvenile male resembles adult male but darker and duller, with generally dark crown, grey face and only a trace of rufous on throat, upperwing lacking iridescence, underparts lacking blue tones, and upperparts and flanks with paler scaling; juvenile female similar to juvenile male but duller, with olive rather than rufous tones and even paler scaling. Race *occidentalis* larger; paler above, forehead sandy, collar pale to mid-chestnut in male.

Habitat. Found in a variety of dense woodland and shrubland habitats, including coastal heathland, wet sclerophyll forest, *Leptospermum* scrub and dense mallee. Range overlaps broadly with *P. chalcophaps*, but latter species is typically found in more open habitats.

Food and Feeding. Seeds of native and exotic plants, with a very small proportion of insects. Native and introduced legumes (Fabaceae), including *Acacia*, *Trifolium* and *Lotus*, are a major food source; other important food plant families include Poaceae, Liliaceae, Epacridaceae and Geraniaceae.

Breeding. Occurs throughout year, with peak in spring and early summer. Nest is a slightly cupped platform, varying from flimsy to quite substantial; may be placed on ground, in bushes or in small trees; sometimes situated on disused nest of another bird or possum. Lays 2 glossy white eggs. In captivity: incubation 16 days; on hatching, chick weighs 12 g, and is covered with pale, sand-coloured down; chicks leave nest at 16-20 days; post-juvenile moult begins at 40-50 days and complete by 100 days.

Movements. Little information; apparently sedentary or undertakes only local movements.

Status and Conservation. Not globally threatened. Numbers have been reduced and species is now absent from part of former range, although in SW Western Australia has increased following spread of introduced clover (*Trifolium*). Much of its favoured coastal heath habitat has been cleared for agriculture or residential development. Has declined even in apparently suitable habitat, e.g. Mt Lofty Range of S South Australia, suggesting that predation of eggs and young by introduced cats and foxes may also be jeopardizing its survival. Occasionally hunted by humans for food.

Bibliography. Blakers *et al.* (1984), Bolyos (1984), Eckert (1972), Frith (1982), Frith, Wolfe & Barker (1976), Higgins & Davies (1996), Lea & Gray (1935), Lindsey, T.R. (1992), Macdonald (1988), McFarland (1994), Pizzey & Doyle (1980), Rutgers & Norris (1970), Schodde (1988), Schodde & Tidemann (1986), Serventy & Whittell (1976), Seth-Smith (1904), Simpson & Day (1996), Troupson & Troupson (1987).

96. Flock Bronzewing

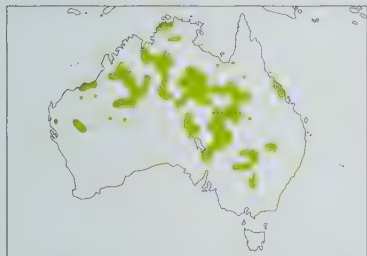
Phaps histrionica

French: Colombine arlequin **German:** Harlekintaube **Spanish:** Paloma-bronce Arlequín
Other common names: Flock/Harlequin Pigeon, Harlequin Bronzewing

Taxonomy. *Peristera histrionica* Gould, 1841, Liverpool Plains, New South Wales.

Genus belongs to the large radiation of Australian bronzewings, which also includes genera *Ocyphaps*, *Geophaps* and *Petrophassa*, and, more distantly, *Chalcophaps* and *Henicophaps*. Present species is the most distinct member of the genus, and formerly awarded its own monotypic genus, *Histriophaps*. Populations of N & W formerly awarded separate race, *alisteri*. Monotypic.

Distribution. WC & NE Western Australia (Kimberley and Pilbara regions) through C Northern Territory and NE South Australia to interior and coastal Queensland and NW New South Wales.



Descriptive notes. 28-31 cm; 227-320 g. Head, sides of neck and foreneck mostly black, with white forehead, lores, malar area and sides of chin forming striking black and white face; typically a continuous white line extends from behind eye and curves around behind and below auriculars; broad white crescent-shaped band on lower throat separates black upper throat from blue-grey underparts; lower nape, hindneck, sides of lower neck and rest of upperparts sandy brown; tail mostly blue-grey, with broad grey-black subterminal band and striking white tip; in flight, uppertail-coverts cover much of blue-grey of tail; central

rectrices sandy brown without white or dark bands; folded wing mostly sandy brown like upperbody, with pale patch at carpal, dark remiges with white spots on tips of primaries and metallic purple patch on tips of secondaries; underparts mostly blue-grey, with sandy brown flanks, grading to blue-grey vent and undertail-coverts, scaled with white; bill black to dark blue-grey; feet and legs dark red. Female much duller, with crown light brown (not black), and sides of head and foreneck mottled brown and black, or grey and black; pale areas of head cream to pale brown (not white), though head pattern of some is very similar to adult male; upperparts paler and duller sandy brown than male; white tips to remiges small or absent; most have broad, ill-defined dull sandy brown breast band, grading to blue-grey lower breast and belly. Juvenile similar to adult female, but facial pattern much duller and less well defined; head and neck mostly light brown, only slightly paler on face; some black smudging on chin and throat of male (lacking in juvenile female); upperparts and wing-coverts have pale fringes, giving scaly appearance; brown neck sides merge smoothly with brown breast-band, which is bordered above by diffuse pale band across lower throat; blue-grey stripe in centre of breast in male (lacking in juvenile female); bill pale horn and legs and feet greyish pink in young birds, gradually darkening to adult coloration.

Habitat. Open grass plains of interior Australia, where annual rainfall measures 200-500 mm; dominant grasses (especially *Astrelba pectinata*) are tussock-forming, and a rich ephemeral community of grasses and herbs develops among the tussocks during wet periods. Also occurs in salt-bush or bluebush plains, spinifex (*Triodia*) grassland, agricultural areas, particularly dry rice fields, sorghum stubble and ploughed paddocks, and along roadsides.

Food and Feeding. Entirely granivorous, feeding on grasses, herbs and a few shrubs. Important food plant families include grasses (Poaceae), Boraginaceae, Euphorbiaceae and Asteraceae.

Breeding. Limited data suggests peak breeding in spring (Sept-Nov) in S Australia, and early to middle dry season (Mar-Jul) in N, but heavy rains may stimulate breeding in any season. Nest is small scrape on ground, sheltered under a bush or grass tussock, usually with a small amount of lining; rarely isolated, more usually in large concentrations. Lays 2 white eggs. In captivity: incubation 16 days, male during day and female at night; at hatching, chick weighs 9 g and is covered with long, thick sand-coloured down; fledging period unknown, but chicks able to walk 1-2 m from nest when only 6-7 days old; moult into adult plumage begins at 50-60 days.

Movements. Highly nomadic, and prone to irruptions following unusually wet years, when occurs far outside normal range e.g. coastal N Queensland. Travels in dense flocks that once numbered 10,000's. Flocks travel daily to water, often over long distances; flight direct and powerful, with continuous wingbeats; when flushed, birds fly up with a loud whirring of wings, which can be near-deafening in a large flock.

Status and Conservation. Not globally threatened. Currently considered near-threatened. No population estimates available, but species formerly more widespread. Scattered sparsely over Western Australia; widespread in arid interior of Northern Territory, where remains common in tropical grassy plains, especially Barkly Tableland; uncommon in most of Queensland, except WC and SW districts; and now rare, despite former abundance, in New South Wales, with few records since 1972. Numbers appear to be greatly reduced from the vast flocks of 19th century, though this may in part reflect a change in dispersal patterns, with widespread establishment of permanent water-holes for livestock allowing populations to remain dispersed in smaller flocks. Grazing by sheep and cattle have degraded tussock grasslands over much of Australia, and further reduction in the species' habitat is likely.

Bibliography. Blakers *et al.* (1984), Fisher *et al.* (1972), Fitzherbert & Baker-Gabb (1988), Fraser (1990), Frith (1982), Frith, Wolfe & Barker (1976), Garnett (1993), Gaukrödger (1931), Higgins & Davies (1996), Lindsey, T.R. (1992, 1995), Loyn (1995), Macdonald (1988), MacGillivray (1932), Marshall (1965), McAllan (1996), Nielsen, L. (1964), Pizzey & Doyle (1980), Read (1991), Rutgers & Norris (1970), Schodde & Tidemann (1986), Simpson & Day (1996), Slater (1978), Troupson & Troupson (1987), Williams (1970).

Genus *OCYPHAPS* G. R. Gray, 1842

97. Crested Pigeon

Ocyphaps lophotes

French: Colombine longup **German:** Spitzschopftaube **Spanish:** Paloma-bronce Crestuda
Other common names: Crested Dove, Crested Bronzewing, Saddleback/Whistle-winged/Topknot Pigeon(!), Top-knot, Wire-wing

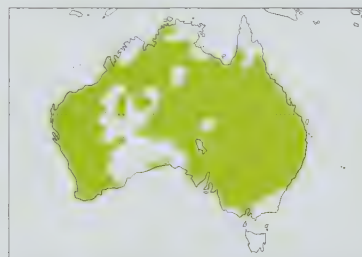
Taxonomy. *Columba lophotes* Temminck, 1822, New South Wales.

Monotypic genus belonging to the large radiation of Australian bronzewings, which also includes the genera *Phaps*, *Geophaps* and *Petrophassa*, and, more distantly related, *Chalcophaps* and *Henicophaps*. Present species included in *Geophaps* by some authors, and is most closely allied with *G. plumifera*. Subspecific differences slight, and may prove to be clinal. Two subspecies currently recognized.

Subspecies and Distribution.

O. l. whitlocki Mathews, 1912 - C & N Western Australia and adjacent parts of Northern Territory and South Australia

O. l. lophotes (Temminck, 1822) - the rest of Australia.



Descriptive notes. 31-36 cm; 150-250 g. Head and neck mostly light grey, with a characteristic long pointed grey-black crest on hindcrown which may be held erect or flattened; nape, hindneck, mantle, back and rump brownish grey, grading to pinkish brown on sides of neck, mantle and upper breast; uppertail blackish brown, with slight green or purple iridescence and narrow white tip; secondary coverts grey with distinct black and pinkish buff barring on lesser and median coverts; most greater secondary-coverts and inner secondaries are iridescent green, bronze or purple, with white tips; underparts pale grey with pinkish-brown

on sides of breast and flanks; bill grey-black; thick pink-red orbital ring; legs and feet pink-red. Sexes similar. Juvenile similar to adult but crest shorter with rounded (not pointed) feathers, and duller overall, with much less iridescence on wings and tail. Race *whitlocki* very similar, averaging slightly smaller and with narrower white tip to tail.

Habitat. Originally restricted to lightly wooded grassland in the arid and semi-arid zones; following clearing of dense coastal forests, has expanded its range into agricultural districts and towns; establishment of watering holes for livestock has also allowed it to expand into yet more arid regions. Now found throughout Australia except in the most arid and treeless deserts, and the densest forests.

Food and Feeding. Feeds on seeds and leaves, and takes small quantities of insects and other invertebrates (up to 10% by volume). Feeds on a variety of herbs and grasses, both native and introduced. Important plant families include Boraginaceae (*Echium*), Fabaceae (*Trifolium*), Euphorbiaceae, Chenopodiaceae and Poaceae. In grain-growing districts, feeds heavily on spilled wheat. Feeds on the ground, usually in small flocks of 5-6 birds, though large flocks may form near water during droughts.

Breeding. Nesting occurs all year round, although relatively few clutches initiated in winter, Apr-Jul. More than 1 brood may be raised; as many as 5-6 clutches can be attempted by 1 pair in a year. Nest is flimsy platform of twigs, typically placed less than 5 m up, in a dense tree or bush. Lays 2 glossy white eggs; incubation 18-20 days; on hatching, chick weighs 9.5 g and is covered with dense down, fawn-coloured above and creamy below; by 13-15 days, chicks are fully feathered, miniature replicas of the adults, with well grown crests. In captivity, chicks leave nest at 16-25 days.

Movements. Little information available, but species is apparently sedentary. Flight characteristic, wings beating rapidly for a short time after abrupt take-off, and then held rigidly extended while the bird glides; when beating, wings produce characteristic metallic whistling sound.

Status and Conservation. Not globally threatened. Now common throughout most of Australia. Has benefited from the European settlement of the continent and associated forest clearance, as well as provision of water supplies for livestock, producing more favourable habitat conditions for present species.

Bibliography. Blakers *et al.* (1984), Brooker *et al.* (1979), Frith (1982), Frith, Brown & Barker (1974), Frith, Carpenter & Braithwaite (1976), Higgins & Davies (1996), Lever (1987), Lindsey, T.R. (1992), Macdonald (1988), Mayr (1951), Paton & Paton (1987), Pizzey & Doyle (1980), Pratt (1973), Rutgers & Norris (1970), Schodde & Tidemann (1986), Serventy & Whittell (1976), Simpson & Day (1996), Troupson & Troupson (1987), Woodall (1985).

Genus *GEOPHAPS* G. R. Gray, 1842

98. Spinifex Pigeon

Geophaps plumifera

French: Colombine plumifère **German:** Rotschopftaube **Spanish:** Paloma Plumifera
Other common names: Plumed Pigeon, Rust-coloured Bronzewing; Red-plumed Pigeon, Western/Red-bellied Plumed-pigeon (*ferruginea*); White-bellied Plumed-pigeon (*plumifera*)

Taxonomy. *Geophaps plumifera* Gould, 1842, Northern Territory.

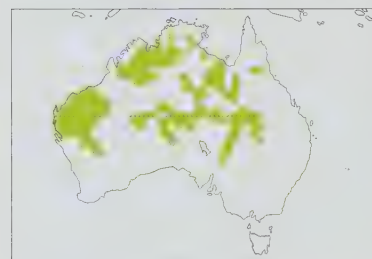
Genus belongs to the large radiation of Australian bronzewings, which also includes the genera *Phaps*, *Ocyphaps* and *Petrophassa* and, more distantly, *Henicophaps* and *Chalcophaps*; genus sometimes lumped into *Petrophassa*. Present species sometimes isolated in monotypic genus *Lophophaps*. Race *ferruginea* has occasionally been treated as separate species; at the other extreme, some authors have considered the variation as referring to colour morphs. Three subspecies normally recognized.

Subspecies and Distribution.

G. p. ferruginea (Gould, 1865) - Western Australia, from De Grey R S to Gascoyne R and E to Carnarvon Range; isolated population of intergrades in W Kimberley (E to Camballin).

G. p. plumifera Gould, 1842 - Western Australia from Edgar Range through Kimberley region into W Northern Territory, E to Top Springs.

G. p. leucogaster (Gould, 1867) - C & E Australia from Petermann Ranges NE to base of Cape York Peninsula, and from McArthur R and Banksia S to L Frome (CE South Australia).



Descriptive notes. 20-24 cm; male 73-130 g, female 70-115 g. Head and neck light brown to rufous brown, with bold facial markings; black supercilium extends from base of upper mandible over bright-red facial mask to above ear-coverts, bordered above by grey forehead and tapering grey line on sides of crown; black moustachial stripe merges with black chin and extends from base of lower mandible below facial mask; broad white band extends across throat, narrowing below eye, to sides of neck; lower throat and lower auriculars black, grading sharply to grey on upper auriculars; crown, crest, nape and hindneck reddish brown; mantle

pale grey-brown, barred dark brown on back; scapulars dark brown, barred paler; rest of upperparts and tail brown with black tips to outer rectrices; secondary coverts rufous brown, with black and pale grey barring; secondaries brown, finely edged buff on outer secondaries and with iridescent green or purple patch on inner secondaries; outlying rufous brown with broad dark brown trailing edge and brown speckling on coverts; underparts generally light rufous brown below, with white on belly and vent and black breast band bordered above by second narrow white breast band; bill black; facial skin and orbital ring red, and legs and feet dark purplish grey. Sexes similar. Juvenile has head and neck mostly rufous-brown, lacking facial pattern of adults, except for black supercilium and scattered white and black feathers on throat and sides of neck; crest shorter than in adult; upperparts mostly brown, with rufous scaling and iridescent dark barring; upperwing-coverts light rufous brown, with darker speckling on secondary-coverts and pale barring to larger coverts; light buff-brown below, with indistinct breast band; bill brownish red; orbital skin tan; legs and feet reddish brown. Races differ most obviously in underpart colour: *leucogaster* has extensive white on lower breast, belly and vent, with upperparts paler brown than nominate and buff fringes to many feathers; *ferruginea* entirely light rufous brown below, except narrow band of barred feathers across breast, with no pale band above.

Habitat. Typically found in arid grassland dominated by tussock-forming spinifex grasses of the genera *Triodia* and *Plectrachne*; also a variety of kinds of open woodland, especially with rocky ridges, in which spinifex is replaced by other grass species. Absent from areas without reliable water supply.

Food and Feeding. Almost entirely granivorous, with only very small quantities of insects taken; in one study, herb seeds formed 55% of diet by volume, grasses 32% and fallen seeds of shrubs and trees 13%; important food plant families include Amaranthaceae, Euphorbiaceae, Brassicaceae and Capparaceae (herbs), Poaceae (grasses) and Fabaceae and Myrtaceae (trees and shrubs). Feeds exclusively on the ground; usually seen in small flocks, but sometimes encountered in pairs or larger flocks up to 150 birds.

Breeding. Can breed all year round, but most nesting apparently in spring and early summer; breeding stimulated by rainfall, but species capable of breeding under all but the most severe drought conditions. Nest is a scrape sheltered under a spinifex clump, bush or rock. Lays 2 white eggs; incubation 16-17 days; on hatching, chicks weigh 4-7 g and are covered with long, sand-coloured down; chicks leave the nest at only 7-8 days, following their parents. In captivity, growth of body parts continues until 32 days, with weight increasing until 70 days.

Movements. One of the few birds of the Australian arid zone that is largely sedentary, undertaking only local movements and gathering at water-holes during droughts. Found in coveys of 5-50 birds outside breeding season. Almost entirely terrestrial; when flushed, it rises with a quail-like whirr of wings, and then glides on down-curved wings.

Status and Conservation. Not globally threatened. Still common to abundant throughout much of its remote and arid range. Habitat destruction is a less serious concern than for many Australian pigeons and doves, due to the rigours of the bleak habitat occupied by this species. However, grazing by sheep may have negatively affected populations in some areas.

Bibliography. Blakers *et al.* (1984), Crome (1976), Ellis (1957), Frith (1982), Frith & Barker (1975), Frith, Carpenter & Braithwaite (1976), Higgins & Davies (1996), Lindsey, T.R. (1992), Macdonald (1988), Mayr (1951), Pizzey & Doyle (1980), Rutgers & Norris (1970), Schodde & Tidemann (1986), Simpson & Day (1996), Tronson & Tronson (1987), Williams *et al.* (1995), Withers & Williams (1990).

99. Squatter Pigeon

Geophaps scripta

French: Colombine marquetée **German:** Buchstabentaube **Spanish:** Paloma Escrita
Other common names: Partridge Bronzewing/Pigeon(!), Blue-eyed Partridge Bronzewing

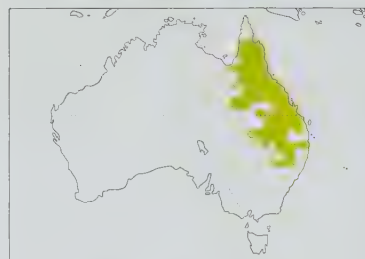
Taxonomy. *Columba scripta* Temminck 1821, Shoalwater Bay, Queensland.

Genus belongs to the large radiation of Australian bronzewings, which also includes the genera *Phaps*, *Ocyphaps* and *Petrophassa* and, more distantly, *Henicophaps* and *Chalcophaps*; genus sometimes lumped into *Petrophassa*. Forms superspecies with *G. smithii*. Race *peninsulae* considered rather distinct, but zone of intergradation in region of Burdekin and Lynd Divide. Two subspecies recognized.

Subspecies and Distribution.

G. s. peninsulae H. L. White, 1922 - NE Queensland, from Cape York Peninsula S to Burdekin R, excepting coastal lowlands.

G. s. scripta (Temminck, 1821) - C & S Queensland (S of Burdekin R) and N New South Wales.



Descriptive notes. 26-32 cm; 200-225 g. Face and throat boldly striped black and white; rest of head, neck and upperparts light grey-brown with paler fringes giving scaly appearance, especially on scapulars; tail blackish brown, slightly paler in centre; upperwing-coverts dark brown, with paler fringes to most coverts and iridescent green or violet patches on inner greater secondary-coverts; remiges blackish brown with fine pale edges and tips; inner secondaries brown with dull iridescent green or violet spots; upper breast light grey-brown becoming bluish grey and narrowing to a point on lower breast and centre of belly, and forming

ing a dark triangle surrounded by white flanks and rest of belly, which show as broad white straps between breast and folded wing; flanks, vent and undertail-coverts brownish grey, with broad white scaling; undertail blackish brown, slightly paler in centre; bill black; orbital skin blue-grey; legs and feet dull purple. Sexes alike. Juvenile has facial pattern indistinct and patchy; rest of head, neck and upperparts duller brown than adult, becoming light brown on uppertail-coverts; scapulars cream to buffy; pale speckling on upperparts forms diffuse pale bands; tail mostly dark brown, indistinctly barred paler, with broad, incomplete blackish brown subterminal band and black-brown outer feathers with pale tips; facial skin buff to pale yellow. Race *peninsulae* differs mainly in its red orbital skin, yellowish in young birds.

Habitat. Open *Eucalyptus* woodland and associated savanna. In past, may have occurred on open plains in S of range, where now very rare.

Food and Feeding. Feeds primarily on seeds, with some insects, particularly in wet season; takes both native and introduced plants, the most important plant families being grasses (Poaceae) and legumes (Fabaceae). Forages exclusively on the ground.

Breeding. Limited data suggest that breeding occurs all year round, with a peak in the dry season; readiness for breeding is apparently strongly influenced by habitat conditions. Nest is a scrape on the ground with a scant lining of grass, sheltered under a grass tussock or bush. Lays 2 glossy white eggs. In captivity: incubation c. 17 days; fledging 9 days. On hatching, chicks covered with fawn-coloured down.

Movements. Little known, but apparently only makes movements on local scale. Like *G. smithii*, largely terrestrial, with quail-like explosive flight when flushed.

Status and Conservation. Not globally threatened. Status poorly known; survey work needed. Nominate race considered vulnerable by RAOU. No population estimates available. Has declined severely throughout much of range, and now almost extinct in New South Wales; remains fairly common only in interior of Cape York Peninsula. Heavy grazing by sheep (in S of range) and cattle (in N) is probably the most important factor in the species' decline, but hunting pressure may also have contributed.

Bibliography. Blakers *et al.* (1984), Crome (1976), Fitzherbert & Baker-Gabb (1988), Frith (1982), Garnett (1993), Higgins & Davies (1996), Lindsey, T.R. (1992), Macdonald (1988), Pizzey & Doyle (1980), Rutgers & Norris (1970), Schodde & Tidemann (1986), Simpson & Day (1996), Slater (1978), Tronson & Tronson (1987).

100. Partridge Pigeon

Geophaps smithii

French: Colombine de Smith **German:** Schuppenbrusttaube **Spanish:** Paloma de Smith
Other common names: Partridge/Smith's Bronzewing, Naked-eyed/Red-eyed/Bare-eyed Partridge-bronzewing

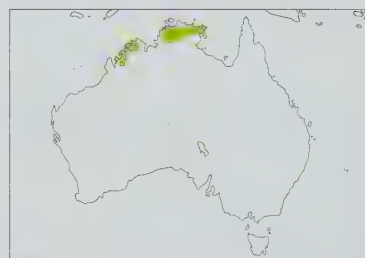
Taxonomy. *Columba Smithii* Jardine and Selby, 1830, Northern Territory.

Genus belongs to the large radiation of Australian bronzewings, which also includes the genera *Phaps*, *Ocyphaps* and *Petrophassa* and, more distantly, *Henicophaps* and *Chalcophaps*; genus sometimes lumped into *Petrophassa*. Forms superspecies with *G. scripta*. Two subspecies recognized.

Subspecies and Distribution.

G. s. blaauii Mathews, 1912 - NE Western Australia (Kimberley region).

G. s. smithii (Jardine & Selby, 1830) - NE Western Australia (from Cockatoo Springs) and N Northern Territory (to at least McArthur R).



Descriptive notes. 25-28 cm; male 160-250 g, female 150-210 g. Head, neck, and upperparts grey-brown, with large area of red facial skin around the eye, extending from base of bill and ending in point above ear, bordered above and below by fine black line; narrow white supercilium extends from base of bill along upper edge of bare facial skin; a second narrow white stripe extends along lower edge of bare facial skin, meeting end of supercilium and curving down sides of neck; chin, most of throat and lower cheeks white, surrounding elongated patch of brown that extends from sides of throat to auriculars; narrow dark brown

band borders lower edge of white throat; upperwing grey-brown, with large iridescent green or purple patches on inner secondaries and inner greater secondary-coverts; breast grey-brown, grading to purplish grey and narrowing to a point on lower breast and centre of sides of belly; this forms a dark triangle surrounded by white of flanks and sides of belly, which appear as white straps between dark underparts and dark folded wings; small patch of pale blue-grey feathers with narrow black subterminal bands on centre of breast; lower belly and vent buff; undertail-coverts dark brown with white scaling; tail dark brown with diffuse black subterminal band; bill black; legs and feet purple-brown. Sexes similar. Juvenile has upperparts and secondary coverts darker brown than adult, with fine rufous scaling and flecking on upperparts and buff fringes to coverts; no iridescence on upperwing; tail with indistinct pale barring; underparts scalloped and freckled paler, cream

to pink-buff; bill horn; legs and feet pale pink; colour of facial skin unknown. Race *blauwi* usually differs in its yellow or bluish yellow orbital skin.

Habitat. Well watered tropical woodlands and open forest; avoids dense forest and treeless areas; prefers open ground cover of annual grasses. Populations discontinuously distributed through range.

Food and Feeding. Almost entirely granivorous. The most important families are grasses (Poaceae), especially *Eriachne*, and legumes (Fabaceae); both native and introduced plants are important in diet. Feeds exclusively on the ground; in non-breeding season found in coveys of 15-20 birds, but in breeding period occurs in pairs or family parties.

Breeding. Some breeding occurs all year round, but peaks in middle of dry season, May-Jul. Nest is a scrape on ground, lined with a few stalks of dry grass and usually at base of clump of dry grass. Lays 2 glossy white eggs; incubation 19 days; chicks weigh 10-11 g at hatching, and covered with down, sandy cinnamon above and sandy white below; by 9 days, young are capable of short, explosive flight and rapid running; moult into adult plumage begins between 43-56 days.

Movements. Little information available on movement patterns. Apparently only locally nomadic in response to food and water availability; quail-like in movements, walking from place to place, and often difficult to flush; when flushed, it gives a few rapid wingbeats interspersed with gliding on down-curved wings.

Status and Conservation. Not globally threatened. Currently considered near-threatened. In Western Australia, restricted to Kimberley Division, but no evidence of decline in numbers or range contraction; remains common in Alligator R area, but range has contracted in other parts of Northern Territory. RAOU considers *smithii* vulnerable; *blauwi* insufficiently known. Most likely threat is habitat degradation caused by feral cattle and water buffalo, but species is also much hunted by Aborigines near settlements and reported to be hunted by feral cats. Was imported, but apparently not released in New Zealand in 1866; unsuccessfully introduced to Hawaii in 1922.

Bibliography. Blakers *et al.* (1984), Brouwer & Garnett (1990), Collar *et al.* (1994), Dowling (1993), Fitzherbert & Baker-Gabb (1988), Frith (1982), Frith, Wolfe & Barker (1976), Garnett (1993), Higgins & Davies (1996), Lindsey, T.R. (1992), Macdonald (1988), Mees (1968), Pizzey & Doyle (1980), Rutgers & Norris (1970), Schodde & Tidemann (1986), Simpson & Day (1996), Slater (1978), Troupson & Troupson (1987).

Genus PETROPHASSA Gould, 1841

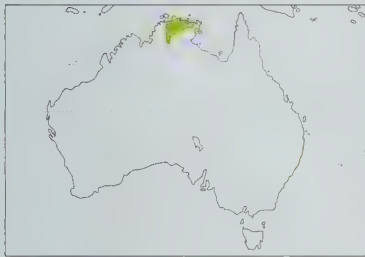
101. Chestnut-quilled Rock-pigeon

Petrophassa rufipennis

French: Colombine rufipenne **German:** Rotspiegeltaube **Spanish:** Paloma Roquera Alirrufa
Other common names: Red-quilled Rock-pigeon

Taxonomy. *Petrophassa rufipennis* Collett, 1898, South Alligator River, Northern Territory. Genus belongs to the large radiation of Australian bronzewings, which also includes the genera *Phaps*, *Ocyphaps* and *Geophaps* and, more distantly, *Henicophaps* and *Chalcophaps*. Present species forms superspecies with *P. albipennis*. Monotypic.

Distribution. Western escarpment of Arnhem Land (N Northern Territory), from Katherine N to Oenpelli, and E to headwaters of Mann R, East Alligator R and Goomadeer R; rarely further E to Maningrida.



Descriptive notes. 28-31 cm; 160 g. Plump ground-dwelling pigeon with long rounded tail and short broad wings, often drooping below tail when perched. Head and neck mostly blackish brown, spotted pale grey; lores iridescent black-green, bordered above by fine pale grey line from bill, extending over and curving behind eye, and bordered below by thin white line from base of bill, below eye to above auriculars; chin and upper throat white mottled buff; Upperbody, tail and upperwing dark sooty brown, with narrow brown scaling, and bright chestnut patch on outerwing, covered by dark brown secondaries and coverts when wing

folded, but conspicuous in flight and spread-wing display; underparts dark brown; bill black; legs and feet purplish black. Sexes alike. Juvenile very similar to adult, but smaller and tends to have rufous tips to wing-coverts.

Habitat. Very much a specialist of open, arid, sandstone gorges and boulder fields and adjacent woodland and spinifex habitats; woodlands dominated by *Eucalyptus*; spinifex communities dominated by tussock-forming grasses with a diverse herbaceous community.

Food and Feeding. Granivorous; the most important food plants are various species of Fabaceae, particularly members of genus *Acacia*; other important food-plant families are Poaceae and Myrtaceae (*Eucalyptus*). Forages on the ground.

Breeding. Limited field data; nest remained undescribed until 1972. Data from specimens suggests breeding occurs all year round, with possible peak in late wet season in Feb; most nests have been found in the dry season, May-Nov. Nest is substantial platform, with base of dry sticks and pad of

leaves and grasses, placed on a shaded ledge or crevices among sandstone rocks; in captivity, both birds participate in nest building. Lays 2 creamy glossy white eggs (shell feels greasy). In captivity: incubation 15-19 days; on hatching, chick weighs 5 g and is covered with down, sand-coloured above and yellowish below; primaries break from their quills at 7 days, and by 14 days wings are fully feathered; young leave nest at 16-21 days old; body moult into adult plumage begins at c. 150 days.

Movements. As far as is known, undertakes only local movements in response to changing food and water availability. Like *P. albipennis*, takes off with a characteristic wing clatter, and flies with alternate flaps and glides.

Status and Conservation. Not globally threatened. No population estimates available. Species is common in appropriate habitat within its very limited range. Possible long-term threats include the development of uranium mines in the region, increasing human settlement, and habitat disruption, as well as the spread of feral cats.

Bibliography. Blakers *et al.* (1984), Frith (1972, 1982), Frith, Wolfe & Barker (1976), Higgins & Davies (1996), Lindsey, T.R. (1992), Macdonald (1988), Pizzey & Doyle (1980), Rix (1970), Schodde & Tidemann (1986), Simpson & Day (1996), Troupson & Troupson (1987).

102. White-quilled Rock-pigeon

Petrophassa albipennis

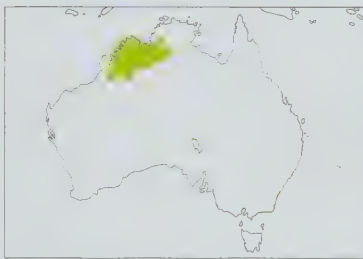
French: Colombine des rochers **German:** Weißspiegeltaube **Spanish:** Paloma Roquera Aliblanca
Other common names: White-winged Rock-pigeon/Bronzewing

Taxonomy. *Petrophassa albipennis* Gould, 1841, Victoria River, Western Australia. Genus belongs to the large radiation of Australian bronzewings, which also includes the genera *Phaps*, *Ocyphaps* and *Geophaps* and, more distantly, *Henicophaps* and *Chalcophaps*. Present species forms superspecies with *P. rufipennis*. Two subspecies recognized.

Subspecies and Distribution.

P. a. albipennis Gould, 1841 - NE Western Australia, in Kimberley region from Oobagooma to Kununurra, and N Northern Territory, N of Baines R and into ranges of Fitzmaurice R.

P. a. boothi Goodwin, 1969 - N Northern Territory, from Stokes Range to Waterloo Station and SE to upper reaches of Baines R.



Descriptive notes. 28-30 cm; male 106-156 g, female 103-145 g. Plump ground-dwelling pigeon with long rounded tail and short, broad wings that often droop below tail when perched; forehead, crown and nape mottled grey-brown; lores glossy black, bordered above by a fine white line extending from base of bill and curving around behind eye, and bordered below by a second white line from base of bill, extending below eye and curving over top of ear-coverts; chin and throat black, with fine white spots; rest of head and neck brownish grey; upper body, tail and upperwing-coverts dark brown with narrow buff edging, forming

scaly appearance; remiges black-brown; prominent white patch on outer primaries conspicuous in flight, mostly hidden when wing is folded; bill black; legs purplish black. Considerable individual variation, with some birds appearing more dusky grey and others more reddish brown; former appear to be mainly females. Juvenile closely resembles adult, but has narrow rufous margins to upperwing-coverts. Race *boothi* has wing patch greatly reduced or absent; underparts darker brown than upperparts, with distinct paler scaling.

Habitat. Rocky sandstone and limestone plateaux and associated gullies, and escarpments. Often on bare rocks; the associated vegetation is arid open woodland and spinifex grassland. Usually not far from permanent water.

Food and Feeding. Granivorous; takes seeds from a variety of plants, depending on availability; important plant families include Fabaceae (*Acacia*, *Desmodium*), Cyperaceae, Poaceae and Zygophyllaceae. Forages on the ground.

Breeding. Apparently occurs all year round; nests found in all months except Feb, Apr, Sept and Dec. Nest variable, some being scant platforms of twigs with little or no lining, others more substantial with lining of spinifex; also nests in hollows scooped in the ground and lined with grass; nest placed among rocks, in exposed or shaded location. Lays 2 creamy white eggs; incubation 17-19 days; hatching weighs 4-5 g and is covered with sand-coloured down, darkest on head; at 12 days, chicks can run and hide if nest disturbed; may leave nest permanently at 15 days; development in aviary birds is similar to *P. rufipennis*.

Movements. Apparently undertakes only local foraging movements. Like *P. rufipennis*, takes off with a characteristic wing clatter, and flies with alternate flaps and glides.

Status and Conservation. Not globally threatened. No population estimates available. Reported to be common around Jasper Gorge in mid-1970's but may have declined since then. The greatest threat may be feral cats, which are numerous within the species' very small range.

Bibliography. Blakers *et al.* (1984), Crome & Johnstone (1979), Frith, C.B. (1970), Frith, H.J. (1972, 1982), Frith, H.J., Carpenter & Braithwaite (1976), Frith, H.J., Wolfe & Barker (1976), Goodwin (1969), Higgins & Davies (1996), Hill (1911), Lindsey, T.R. (1992), Macdonald (1988), Pizzey & Doyle (1980), Schodde & Tidemann (1986), Simpson & Day (1996), Troupson & Troupson (1987).



Genus *GEOPELIA* Swainson, 1837

103. Diamond Dove

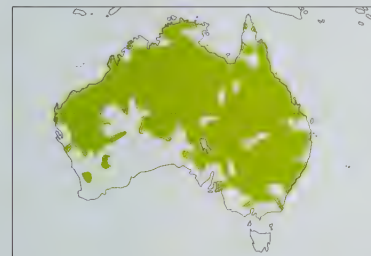
Geopelia cuneata

French: Géopélie diamant **German:** Diamanttäubchen **Spanish:** Tortolita Diamante
Other common names: Little/Red-eyed Dove, Little Turtle-dove

Taxonomy. *Columba cuneata* Latham, 1801, Sydney, New South Wales.

Despite superficial resemblances to *Streptopelia*, genus probably most closely related to bronzewing group (*Phaps* and allies), based on behaviour. Monotypic.

Distribution. Arid interior Australia; largely absent from SW Western Australia and coastal E Queensland S to Victoria and W to South Australia. Occasional irruptions to coastal areas.



Descriptive notes. 19–24 cm; 28–43 g. A tiny, delicate dove with a long pointed tail. Male has head, neck, breast and flanks pale blue-grey, with paler grey chin; grades to darker brown or grey-brown on upperbody and central uppertail; scapulars and secondary-coverts covered with many small white spots (narrowly edged black), forming a diagnostic spotted patch in otherwise plain plumage; rest of upperwing dark brown with large chestnut panel in primaries, prominent in flight; outer rectrices black with broad white tips which form prominent white sides or corners to spread tail; undertail white when closed, shows black

strip down centre when spread; belly, vent, and undertail-coverts white; bill dark grey, grading to black at tip; iris scarlet and orbital ring dark pink to bright red; legs and feet pink. Female similar but generally browner above; orbital ring duller pink. Juvenile differs from adult male by extensive fine barring on neck, breast and upperparts; few or no white spots on coverts; blue-grey areas of plumage duller, light grey; chin white; bill light grey-brown, with dark tip; iris light brown; orbital ring light grey or brown to pale orange; legs and feet grey to brown.

Habitat. Lightly wooded, arid or semi-arid grassland with reliable water supply in the vicinity. Often seen along roads and tracks.

Food and Feeding. Almost wholly granivorous, although small amounts of leaves and insects are taken; grasses are the most important component of diet, followed by legumes (Fabaceae), with a variety of other herbs taken, depending on availability. Present species notable for the very small size of seeds it takes. Feeding is entirely on the ground, typically in flocks of 20–30 birds.

Breeding. Limited data available indicate a seasonal pattern to breeding, which is strongly influenced by rainfall and food availability; in most years, peak appears to be in spring and early summer, but nests may be found at any time. Nest is flimsy platform of twigs or dried grass, in a bush, tree, or almost any other support. Both sexes build nest, incubate and care for young. Lays 2 white eggs; incubation 13 days; hatchlings weigh only 2–4 g and are covered with long sand-coloured down. In captivity: fledging 11–14 days; chicks fed by adults for two weeks after leaving nest; able to breed from shortly after 3 months old.

Movements. Nomadic, sometimes moving considerable distances in response to availability of water and food. Tends to congregate around water sources in dry season, dispersing more widely in wet season. Undergoes irruptions in response to water and food availability. Flight is swift, strong and undulating.

Status and Conservation. Not globally threatened. Common throughout much of its extensive range. Occupies one of the less threatened habitat types of Australia, frequently in areas with relatively limited human impact.

Bibliography. Blakers *et al.* (1984), Brooker *et al.* (1979), Ey (1984), Frith (1982), Frith, Wolfe & Barker (1976), Goodwin (1960a, 1967), Higgins & Davies (1996), Lindsey, T.R. (1992), Macdonald (1988), Mayr (1951), Pizzey & Doyle (1980), Rutgers & Norris (1970), Schleucher (1993), Schleucher & Prinzinger (1991), Schleucher *et al.* (1991), Schodde & Tidemann (1986), Simpson & Day (1996), Tronson & Tronson (1987).

104. Zebra Dove

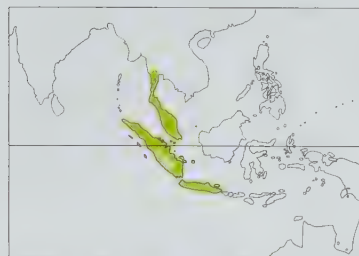
Geopelia striata

French: Géopélie zébrée **German:** Sperbertäubchen **Spanish:** Tortolita Estriada
Other common names: Zebra Ground-dove

Taxonomy. *Columba striata* Linnaeus, 1766, Java. Despite superficial resemblances to *Streptopelia*, genus probably most closely related to bronzewing group (*Phaps* and allies), based on behaviour. Present species forms a superspecies with *G. placida* and *G. maugei*, and all three have sometimes been considered conspecific; however, songs of all three forms are distinctly different. Monotypic.

Distribution. S Myanmar (Tenasserim) through Malaysia to Sumatra and Java. Widely introduced, and there is considerable uncertainty about its original native range, notably in Borneo, Philippines, Bali and Lombok. Feral populations well established in Thailand, Borneo, Sulawesi, Moluccas (Ambon), Tahiti, Hawaiian Is, St Helena, Madagascar and Seychelles.

Descriptive notes. 21 cm. A slender, long-tailed dove; forehead, face, and throat pale bluish grey; top of head and nape grey-brown; hindneck finely barred whitish brown and blackish; sides of neck, breast, and flanks barred black; centre of breast mauve-pink, becoming white on belly and undertail-coverts; upperparts light brown becoming grey on wing-coverts, with black edging to feathers giving a barred effect; secondaries and primaries dark greyish brown with some chestnut on basal parts of the inner webs forming an obscure patch on the underside of the wing; underwing-coverts pale rufous barred with blackish; central tail feathers grey, the four outermost on each side blackish with prominent white tips; orbital skin blue, sometimes with greenish or greyish tinge; bill grey or grey-brown at tip, shading to bluish or greenish grey at base; feet and legs dull pink. Sexes alike. Juvenile paler and browner than adult; barred feathers on back and wing-coverts have buff fringes.



Habitat. Wide variety of open habitats with some bushes or trees, including dry woodland, scrubland, agricultural areas, gardens and cities. Generally restricted to lowlands; up to 900 m in Sumatra.

Food and Feeding. Diet consists of a variety of small seeds, especially weed and grass seeds, with a small amount of insects. On Hawaii (where introduced), diet was 97% plant, 3% animal matter; in Philippines, 70% weed seeds and 30% rice, with only 1 bird in 305 having eaten animal material. Feeds on the ground, in pairs or small groups.

Breeding. Information from introduced range. Nest flimsy in Hawaii but substantial in Seychelles; placed 1–10 m above ground, or on it where predators absent. Lays 2 white eggs; incubation 13 days; fledging 11–12 days.

Movements. Little specific information. Probably sedentary or only locally nomadic in response to food and water availability.

Status and Conservation. Not globally threatened. Common throughout much of its wide range; very common in Sumatra. Uncertainty concerning precise limits of original range due to widespread introduction in neighbouring areas; research into “natural” populations is highly desirable.

Bibliography. Berger (1981), Bucknill & Chasen (1990), Christidis & Boles (1994), Coates & Bishop (1997), Deignan (1945), Diamond, A.W. (1985b), Dickinson *et al.* (1991), Greig-Smith (1981), Harrison (1969a), Hellebrekers & Hoogerwerf (1967), Lekagul & Round (1991), Lever (1987), MacKinnon (1988), MacKinnon & Philipps (1993), Madoc (1976), Manuel (1934), van Marle & Voous (1988), Medway & Wells (1976), Penny (1974), Robinson (1927), Rösler (1996), Round (1988), Rutgers & Norris (1970), Schwartz (1950), Schwartz & Schwartz (1950, 1951), Smythies (1981, 1986), Thibault & Rives (1988), White & Bruce (1986).

105. Peaceful Dove

Geopelia placida

French: Géopélie placide **German:** Friedenstäubchen **Spanish:** Tortolita Plácida
Other common names: Placid Dove

Taxonomy. *Geopelia placida* Gould, 1844, Port Essington, Northern Territory.

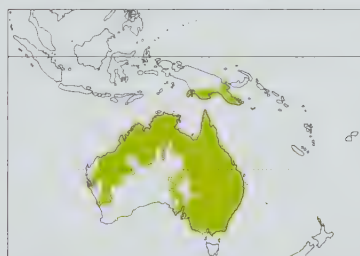
Despite superficial resemblances to *Streptopelia*, genus probably most closely related to bronzewing group (*Phaps* and allies), based on behaviour. Present species forms a superspecies with *G. striata* and *G. maugei*, and all three have sometimes been considered conspecific. Three subspecies recognized.

Subspecies and Distribution.

G. p. papua Rand, 1938 - S New Guinea from Merauke E to Port Moresby; also Markham Valley and Madang and upper Ramu Valley.

G. p. placida Gould, 1844 - N & E Australia.

G. p. clelandi Mathews, 1912 - Pilbara region, NC Western Australia.



Descriptive notes. 20–24 cm; 41–66 g. Similar to *G. striata*, but with proportionately longer, more pointed wings; overall paler; barring more extensive, extending across centre of breast; no chestnut on inner webs of wing quills, but underwing-coverts dark chestnut, without barring; legs and feet pink-red, with dark brown scales at front. Races vary in coloration: *clelandi* slightly paler brown.

Habitat. Occupies a wide variety of open habitats with grassy understorey and at least scattered bushes or trees, including sclerophyll forest, woodland and tall scrubland with a grassy understorey; dominant trees in such

habitats include *Eucalyptus*, *Acacia* or *Casuarina*. Also in agricultural country where some native vegetation persists, and in towns and urban areas.

Food and Feeding. Diet consists primarily of small seeds, especially of grasses and sedges, with a small amount of insect and other invertebrate food; in addition to Poaceae and Cyperaceae, important plant families include Asteraceae, Euphorbiaceae, and Fabaceae. Forages on the ground, often in open areas, including pastures, roadsides and lawns; usually feeds in pairs or small flocks.

Breeding. Breeds in all months, with less activity during peak of dry season. Pairs may initiate several clutches (as many as 8) in a single season. Nest is a small platform of twigs, located in horizontal forks, vine tangles, or epiphytes; situated 0.6–1.6 m (mean 3–3 m) above ground. Lays 2 white eggs; incubation 13–14 days, by both sexes; hatchlings semi-altricial, nidicolous and covered with silver-grey down; primaries and some secondaries emerge from quills at 6 days; fledging c. 16 days; moult nearly complete at 24 days; young fed by adults for several weeks after fledging. Fledging success at 22 nests was 33% (14 fledglings from 42 eggs).

Movements. Sedentary, with limited local movements in response to food and water availability.

Status and Conservation. Not globally threatened. Adaptable, widespread and common in many parts of its sizeable range. Ability to colonize urban areas, and make use of agricultural land indicate species probably secure at present.

Bibliography. Beehler *et al.* (1986), Bellchambers *et al.* (1994), Blakers *et al.* (1984), Christidis & Boles (1994), Coates (1985), Frith (1982), Frith, Braithwaite & Wolfe (1974), Frith, Wolfe & Barker (1976), Garnett & Crowley (1994a), Harrison (1969a), Higgins & Davies (1996), Johnstone (1992), Lever (1987), Lowe (1956), Mackay (1976), Mayr (1951), Mayr & Rand (1937), Rutgers & Norris (1970), Tubb (1945).

106. Barred Dove

Geopelia maugei

French: Géopélie de Mauge **German:** Zebraäubchen **Spanish:** Tortolita de Timor
Other common names: Timor Zebra Dove

Taxonomy. *Columba Maugeus* Temminck, 1811, Timor. Despite superficial resemblances to *Streptopelia*, genus probably most closely related to bronzewing group (*Phaps* and allies), based on behaviour. Present species forms a superspecies with *G. striata* and *G. placida*, and all three have sometimes been considered conspecific. Specific name sometimes erroneously spelt *maugeus* or *maugea*; original spelling emended by Temminck himself in 1811. Possible race *audacis* of Tanimbar and Kai Is appears insufficiently distinct to merit recognition. Monotypic. **Distribution.** Sumbawa E to Tanimbar Is (Lesser Sundas) and Kai Is (SE Moluccas). Also present on Tukangbesi Is (Tomea), where presumed to be feral.



Descriptive notes. 22-25 cm. Similar to *G. striata*, but darker and more strongly barred, with barring extending into lower breast and flanks; belly white; extensive chestnut areas on wing quills and chestnut underwing-coverts; orbital skin chrome yellow, iris pale yellow. **Habitat.** Sparse woodland in open country, open monsoon woodland, and margins of mangroves; also cultivated areas and grassland with or without bushes, and in and around villages. Occurs from sea-level up to 500+ m on Sumba, 1100 m on Timor, and 1400 m on Flores.

Food and Feeding. No specific data available.

Diet presumed to be similar to that of closely related *G. placida*. Usually seen alone, in pairs or in small flocks.

Breeding. Apparently breeds at least Apr-Jul on Sumbawa and Flores based on evidence of collected specimens. No further information available.

Movements. No information available.

Status and Conservation. Not globally threatened. Very little precise information available on status. Generally moderately common, but locally very common; presence in cultivation and the vicinity of villages suggests species is adaptable to human environments. Much research required in order to establish basic details of biology.

Bibliography. Andrew (1992), Bishop (1992), Bruce (1987), Christidis & Boles (1994), Coates & Bishop (1997), Gibbs (1990), Harrison (1969a), Hartert & Goodson (1918), Mayr (1944b), Mees (1975), Rensch (1931), Rösler (1996), Schodde & Mathews (1977), White & Bruce (1986).

107. Bar-shouldered Dove *Geopelia humeralis*

French: Géopélie à nuque rousse **German:** Kupfernackentäubchen **Spanish:** Tortolita Humeral
Other common names: Bronze-necked/Copper-necked/Barred-shouldered/Mangrove/Scrub Dove, Pandanus/River Pigeon

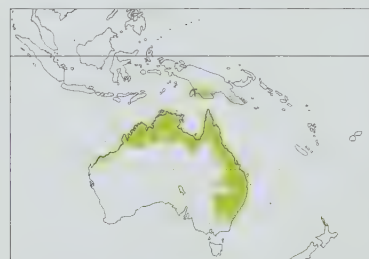
Taxonomy. *Columba humeralis* Temminck, 1821, Queensland. Despite superficial resemblances to *Streptopelia*, genus probably most closely related to bronzewing group (*Phaps* and allies), based on behaviour. Validity of races has been questioned, as differences appear very minor. Three subspecies recognized.

Subspecies and Distribution.

G. h. gregalis Bangs & J. L. Peters, 1926 - SE New Guinea.

G. h. humeralis (Temminck, 1821) - N & E Australia.

G. h. headlandi Mathews, 1913 - Pilbara region, NC Western Australia.



Descriptive notes. 26-30 cm; 110-150 g. Upperparts light greyish brown, paler and tinged with pink on the upperwing-coverts, forming a distinctive pink shoulder bar; large chestnut patch on primaries, prominent in flight; hindneck and upper part of mantle coppery buff, with conspicuous black scalloping; head, sides of neck and breast bluish grey, paler on the forehead; lower breast and flanks pink, sharply demarcated from blue-grey upper breast; belly, vent and undertail-coverts buffy white; all upperpart contour feathers except the forehead have narrow black terminal bands giving a scaled effect; four central tail feathers

greyish brown; the rest chestnut with broad white tips; orbital skin and bill bluish grey; feet dull red. Sexes similar. Juvenile duller than adult, with buff fringes to most feathers and barred buff and brown on parts that are grey in adult. Races differ mainly in coloration: *headlandi* smaller, with pinker underparts and paler upperparts.

Habitat. Shrubby woodland and transition zones between woodland and swamps or mangroves; a characteristic species of *Pandanus* swamps that divide woodland from floodplains. Common in tropical towns and in agricultural regions with remnant trees. In semi-arid country, species is typically restricted to edges of swamps or creeks. Where overlaps with *G. placida*, present species generally found in moister, more shrubby areas.

Food and Feeding. A varied diet of small seeds, with a small amount of leaves and buds. Near Port Moresby, SE New Guinea, an introduced weed (*Eleutheranthera*, Asteraceae) is the most important food item, followed by grasses, legumes, and a variety of herbs. In Australia, grasses and sedges are most important, and in some months sedge rhizomes form almost the exclusive food; these plants are followed by a varied list of other families, none of great individual importance. Feeds mostly on the ground, in pairs or small flocks of up to 40 birds.

Breeding. Can breed all year round, but most nesting apparently occurs in late wet and early dry seasons, a period of food abundance for granivorous birds. Nest is a small, frail platform of sticks, usually low in a bush or small tree. Lays 2 glossy white eggs; incubation 14-16 days; hatchlings weigh c. 8 g and are covered with light fawn-coloured down. In captivity, fledging 16-21 days.

Movements. Sedentary, undertaking only local movements. Flight is strong and direct, without undulations.

Status and Conservation. Not globally threatened. No population estimates available. Common throughout most of its sizeable range. In New South Wales, distribution has apparently expanded since late 1950's. However, declines may have occurred in the more developed southern parts of the species' range, and there is suggestion that spread of the introduced *Streptopelia chinensis* may be negatively affecting present species.

Bibliography. Bangs & Peters (1926), Beehler *et al.* (1986), Bellchambers *et al.* (1994), Blakers *et al.* (1984), Coates (1985), Frith (1982), Frith, Braithwaite & Wolfe (1974), Frith, Wolfe & Barker (1976), Higgins & Davies

(1996), MacGillivray (1914), Mackay (1976), Mayr (1951), Mayr & Rand (1937), Mees (1982a), Pratt (1973, 1978), Rutgers & Norris (1970).

Genus *LEUCOSARCIA* Gould, 1843

108. Wonga Pigeon

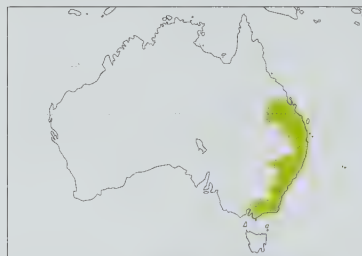
Leucosarcia melanoleuca

French: Colombine wonga **German:** Wongataube **Spanish:** Paloma Wonga
Other common names: Wonga Wonga, White-fleshed/Wonga Wonga Pigeon

Taxonomy. *Columba melanoleuca* Latham, 1801, Port Jackson, New South Wales.

Monotypic genus of uncertain affinities; considered by some to be derived from bronzewings (*Phaps* and allied genera), but other authors have suggested a relationship with *Gallinolumba*, or with the monotypic *Trugon* of New Guinea. Monotypic.

Distribution. E Australia, from CE Queensland (Rockhampton) to CS Victoria (Melbourne), in coastal regions and adjacent mountains, extending as far as 400 km inland, in Carnarvon Range (SC Queensland).



Descriptive notes. 38-45 cm; 330-500 g. Plump semi-terrestrial pigeon with small head, short, broad wings and long tail; upperparts slate-grey; tail bluish black, with white tips to all but central tail feathers; upperwing blackish brown; forehead, forecrown, chin and upper throat white, becoming grey on rest of head and neck; lores black; grey foreneck extends onto breast, narrowing to a point in centre of lower breast; a grey spur extends from sides of neck onto sides of breast, parallel to edges of dark V in centre of breast, leaving large, sharply defined white V on otherwise grey breast; belly and flanks white with brown-

black crescents or wedges on sides; undertail-coverts dark brown, with buffy fringes; bill reddish at base, brown distally; legs and feet deep pink-red. Sexes similar. Juvenile like adult, but scapulars and upperwing-coverts brown-grey; upperwing primaries and outer secondaries have narrow cream outer edges; and ventral markings not so well defined, with the white V appearing smudged.

Habitat. Dense rain forest and scrubby forest in gullies, especially with an understorey of *Acacia* or *Exocarpus*; sometimes in open woodland, provided dense understorey is present; visits clearings, roadsides and gardens in forested areas. Requires ample cover and relatively clear forest floor for walking. In New South Wales, reported at all elevations up to 900 m.

Food and Feeding. Feeds on fruits and seeds, which are digested with help of its muscular gizzard; limited data indicate the importance of the food plants *Acacia* (Fabaceae), *Lantana* (Verbenaceae), *Phytolacca* (Phytolaccaceae) and *Solanum* (Solanaceae); also feeds on snails and insects. Feeds on the ground, or from low bushes that can be reached from the ground; may scratch in the soil or leaf litter; usually solitary when feeding.

Breeding. Breeding occurs throughout year, with peak in spring and summer. Nest is moderately substantial, averaging c. 30 cm in diameter and 9 cm deep, and is commonly placed in horizontal forks of a large-limbed forest tree, 2-16 m up. Lays 2 white eggs; at one nest, the young fledged at 26-27 days old.

Movements. Apparently sedentary. Almost always seen on the ground, where walks strongly, with bobbing head; typically very alert and wary, though may become tame in areas where undisturbed; flies up with a loud wing-clap when flushed.

Status and Conservation. Not globally threatened. Remains common in many areas, although has declined over much of its range, e.g. in N Queensland, Victoria Atlas and N New South Wales, due to hunting and forest clearing; range has also contracted at S and W extremities. Population in New South Wales estimated at 4000-5000 birds. Unsuccessful introductions attempted on Kangaroo I (off SE South Australia) in 1946, and Hawaii and New Zealand in 1864-1883.

Bibliography. Blakers *et al.* (1984), Dunn (1983), Frith (1952a, 1982), Higgins & Davies (1996), Lindsey, T.R. (1992), Macdonald (1988), Marchant (1987, 1989b), Pizzey & Doyle (1980), Rutgers & Norris (1970), Schodde & Tidemann (1986), Simpson & Day (1996), Trounson & Trounson (1987).

Genus *ZENAIDA* Bonaparte, 1838

109. American Mourning Dove

Zenaida macroura

French: Tourterelle triste **German:** Carolinataube **Spanish:** Zenaida Huilota
Other common names: Carolina Dove

Taxonomy. *Columba macroura* Linnaeus, 1758, West Indies.

Formerly placed in genus *Zenaidura*. Forms superspecies with *Z. graysoni* and *Z. auriculata*; until recently considered conspecific with former. Five subspecies recognized.

Subspecies and Distribution.

Z. m. marginella (Woodhouse, 1852) - British Columbia, Saskatchewan and Manitoba S to Baja California, Oklahoma and W Arkansas, and on to SC Mexico.

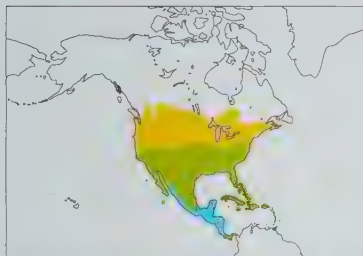
Z. m. carolinensis (Linnaeus, 1766) - Wisconsin, Michigan and S Ontario to C New York, S Maine, New Brunswick and Nova Scotia, and S to Gulf coast of Florida, Bahama Is and Bermuda.

Z. m. macroura (Linnaeus, 1758) - Cuba, I of Pines, Hispaniola, Puerto Rico and Jamaica.

Z. m. clarionensis (C. H. Townsend, 1890) - Clarion I in Revillagigedo Archipelago (off W Mexico).

Z. m. turturilla Wetmore, 1956 - Costa Rica and W Panama.

Descriptive notes. Male 27-34 cm, 110-170 g; female 22-5-30 cm, 100-156 g. Forward part of forehead and supercilary fawn becoming grey on cap and occiput; hindneck greyish brown, metallic



purple or bronze, gloss on sides of neck; small black facial streak below eye; back, upperpart-coverts and wings greyish brown; rump greyish, darker grey on sides; roundish black spots on inner wing-coverts and scapulars; primaries black, edged white; middle pair of rectrices, same colour as back; other rectrices grey with black bar and greyish white or white tips; tail long and graduated; underparts fawn, paler on chin and throat, shading to pinkish fawn on breast; iris dark brown, eye surrounded by narrow orbital skin of light blue or greenish blue; bill black, thin and delicate looking, gape red; legs and feet dull red. Female paler, with less grey on head

and less iridescence on neck. Juvenile resembles female but has pale buff fringes to most feathers and blackish spots on some head and breast feathers. Race *carolinensis* is darker than race *marginella*; *turturilla* and *macroura* are shorter winged than N American races; nominate tends to be darker with a deep buff belly; *turturilla* pale grey, with longer bill; *clarionensis* relatively large-footed, large-billed and dark, while forehead tends to be chestnut and thus reminiscent of *Z. graysoni*.

Habitat. A very successful species that has adapted well to human agricultural practices. Usually in savanna, but also thrives in arid or semi-arid areas from sea-level up to 2500 m E of Sierra Nevada divide in California, and to 2300 m in Costa Rica. Sometimes in willows and cottonwoods along stream courses, or among oak and digger pines (*Pinus sabiniana*) in California Sierran foothills. Although present species has been shown to survive well without drinking for 4-5 days at temperatures of 23°C, water is a prerequisite and birds will fly long distances to water-holes, to drink at dawn and dusk; sometimes flocks will roost by a drinking place and leave the following morning. May breed in extremely hot regions e.g. at Deep Canyon, California, recorded incubating in ambient temperatures of 44°C.

Food and Feeding. 99% of diet consists of seeds and other plant matter; seeds taken from the ground or directly from plant stalks. In one study, 200 different species of seeds were found in birds' crops, of which grasses comprised over 50%. Pine seeds are an important item in some areas, notably in Mississippi, and wherever available, agricultural foods (corn, wheat) are also eaten; in other areas composites important, e.g. sunflowers (*Helianthus*), thistles (*Cirsium*), *Oxalis*, *Croton*, or buckweed (*Polygonum*). Animal food taken includes grasshopper eggs, ants, scales, beetles, isopods; both aquatic and land snails eaten throughout range; one crop was found to contain 125 snails of one species, while another held 58 snails of three species; both dead and live snails are consumed, apparently to fulfill calcium requirements; snail-eating is prevalent in breeding season, and snails are fed to young.

Breeding. Length and peak of season varies between regions; season short in N latitudes; in S of range, may occur Feb-Oct; in Utah to California Mar-Sept; in Arizona all months except Nov and Dec; study in Michigan indicated onset of breeding varies with weather conditions, since cold weather delays breeding and unusually warm weather advances it. Nest of sticks, is often one of flimsiest of dove nests; may be placed on ground in treeless prairies, or in bushes, trees or sometimes cauti, up to 15 m above ground (usually 2-3 m); on Snake River Plain (SE Idaho), nests placed on ground under sagebrush (*Artemisia*); it has been speculated that doves raised in ground nests would in turn build on ground, and those hatched in trees would later nest in trees. Old nests often reused, and in one study 20-40% of clutches laid in old nests of doves or other species; marked birds have been known to lay in same nest for 2-4 consecutive years. Usually 2 white eggs (1-3); clutches of 4 eggs have occasionally been found, due to 2 females laying in same nest; incubation 14-15.5 days; fledging 11-15 days; young independent by 30 days. In areas of food abundance, breeding may begin early in the year, and birds may reproduce later the same year of hatching. Males have been known to reach reproductive maturity at 80 days of age and females at 93 days.

Movements. Birds in C & S North America do not migrate. Ringing studies demonstrated species resident at Berkeley, California; a study in Florida revealed that 99% of birds were sedentary, although small numbers dispersed to Alabama, Georgia and South Carolina. Birds from more N latitudes may fly as far S as Mexico, Guatemala, El Salvador, Honduras, Nicaragua and Costa Rica to winter; three birds ringed in South Dakota were recovered in Colima and Jalisco, Mexico, and in El Salvador, having migrated distances of 2900-4000 km. Birds migrate an average of 80-160 km per day, usually at low altitudes. Thousands have been reported, migrating in flocks of 5-50 birds over mesquite in Sonora, Mexico; uncommon transient in Cayman Is; migrants have also been observed crossing Tioga Pass, California, at 3000 m. One study in Missouri indicated that males tended to winter farther N than females. Birds exhibit extraordinary site faithfulness; study in Minnesota showed 80% of marked doves returned to within 61 m of the previous year's breeding site and 50% of these bred within 15 m of previous year's site.

Status and Conservation. Not globally threatened. Still common over many parts of its extensive range. Suffers intense hunting pressure, with c.45,000,000 being killed by man each year in USA alone, but species appears resilient and able to withstand such pressure. Perhaps one of the best managed of all game species.

Bibliography. Acosta & Torres (1984a), Aldrich (1993), Aldrich *et al.* (1958), Andrews & Righter (1992), Armstrong, E.R. & Noakes (1977, 1983), Armstrong, R.H. (1983), Baptista *et al.* (1983), Baskett (1993), Baskett *et al.* (1993), Beaver (1976), Best & Smartt (1986), Biaggi (1983), Binford (1989), Blockstein (1983, 1986a, 1986b, 1989, 1991), Blockstein & Westmoreland (1993), Books-Blenden, Baskett & Brown (1984), Books-Blenden, Baskett & Sayre (1984), Brain (1985), Braun (1979), Breitenbach & Baskett (1967), Brown & Smith (1976), Browning (1962), Brudenell-Bruce (1975), Cannell (1984), Casto (1976), Chambers *et al.* (1962), Conti (1993), Conti & Forrester (1981), Conti *et al.* (1985), Coon *et al.* (1981), Cooperriider *et al.* (1986), Cowan (1952), Craig (1911), Cunningham (1985), Cyr (1995a), Davis (1974), Davison & Sullivan (1963), DeGraaf & Rappole (1995), Dolton (1989), Doucette & Reeb (1994), Dunning (1984), Edmunds & Ankeny (1987), Faanes (1977), Fluetisch & Sparling (1994), Frankel & Baskett (1961), Gates *et al.* (1975), Geissler *et al.* (1987), Goforth & Baskett (1971), Grand & Mirarchi (1988), Griffing & Davis (1978), Griffing *et al.* (1977), Haas & Amend (1976), Hanson & Kossack (1957a, 1957b), Harris & Morse (1958), Hellmayr & Conover (1942), Henry *et al.* (1976), Hitchcock (1986), Hitchcock & Mirarchi (1984, 1986), Hitchcock *et al.* (1989), Hoek (1963), Holcomb & Jaeger (1978), Howe & Flake (1988, 1989), Howell & Webb (1989, 1995a), Hunt (1978), Irby & Blankenship (1966), Jehl & Parkes (1983), Jones (1969), Kantrud & Higgins (1992), Kendall *et al.* (1983), Kreitzer (1971), LaPerriere (1972), LaPerriere & Haugen (1972), Leopold & Dedon (1983), Lever (1987), Lewis (1993), Losito (1989), Losito *et al.* (1990), Luther (1979), Maridon & Holcomb (1971), Marte *et al.* (1985), Martin *et al.* (1961), McClure (1943, 1984), McKinney *et al.* (1984), Merz (1963), Meyers, P.M. (1994), Mirarchi (1993), Mirarchi & Baskett (1994), Mirarchi & Scanlon (1980), Mirarchi *et al.* (1986), Monroe (1968), Morse (1957), Naranjo & Raitt (1993), Nice (1922, 1923), Nichols *et al.* (1984), Nicolai (1969), Ostrand *et al.* (1996), Pearce (1986), Price *et al.* (1995), Purdy (1976), Raffaele (1989), Ranford (1974), Rappole *et al.* (1993), Ridgely & Gwynne (1989), Ridgway (1916), Rivera-Milán (1992, 1993, 1995b, 1996), Root (1988), Rutgers & Norris (1970), Sauer *et al.* (1994), Sayre & Silvy (1993), Sedgwick (1987), Sharp (1971), Shuman *et al.* (1988), Slud (1964), Small (1994), Sotherland & Rahn (1987), Stabler (1951), Stauffer & Best (1986), Stiles & Skutch (1989), Stotz *et al.* (1996), Swank (1955a, 1955b), Tyler & Jenkins (1979), Walsberg (1985), Walsberg & Schmidt (1992), Walsberg & Voss-Roberts (1983), Webster & Bernstein

(1987), Webster *et al.* (1985), Westmoreland (1986, 1989), Westmoreland & Best (1985, 1986, 1987), Westmoreland *et al.* (1986), Wetmore (1968), White *et al.* (1987a, 1987b), Wight *et al.* (1967), Willoughby & Krebs (1986), Wunderle (1967), Yahner (1983), Zammuto (1986).

110. Socorro Dove

Zenaida graysoni

French: Tourterelle de Socorro

German: Socorrotaube

Spanish: Zenaida de Socorro

Other common names: Grayson's Dove

Taxonomy. *Zenaidura graysoni* Lawrence, 1871, Socorro Island.

Formerly placed in genus *Zenaidura*. Has frequently been considered conspecific with *Z. macroura*, but captive studies revealed distinct differences in visual displays and vocalizations; the two species mate assortatively in captivity; hybrids produced by cross-fostering present species under *Z. macroura*, with resultant sexual imprinting on the latter. Best considered to form a superspecies with *Z. macroura* and *Z. auriculata*. Monotypic.

Distribution. Formerly Socorro I in Revillagigedo Archipelago (off W Mexico); now extinct in wild.



Descriptive notes. 26.5-34 cm; 165-215 g. A medium-sized dove, mostly ruddy brown in coloration with bluish grey crown and nape; tail less graduated than in *Z. macroura*; rectrices tipped grey, squarer at tip; bill and legs proportionately longer and brighter red near gape; tip of bill black. Female sometimes indistinguishable from male, but usually slightly duller; grey on occiput is usually less strongly contrasting compared to male, and metallic gloss on neck sides tends to be less brilliant. Juvenile coloration usually duller than female; nape brownish grey as opposed to grey; metallic gloss on neck sides absent; wing-cov-

erts and scapulars edged buffy or cinnamon.

Habitat. Formerly occurred in highland forest at 500-600 m on Socorro I; rarer in lowlands, where principal vegetation is *Ficus continifolia* and *Hippomane*, which occur in patches surrounded by *Croton* and some *Dudouia viscosa* and *Psidium socorroensis* brush. A ground-dweller.

Food and Feeding. Crop contents of wild individuals included fruits of native cherry (*Bumelia socorroensis*) and currant (*Prunus capuli*), as well as various black seeds of unidentified plant species. Captives have been known to strip and eat leaves of tree-ferns and *Impatiens*; some captives also relish live mealworms (*Tenebrio molitor*), suggesting that at least some animal protein was included in their natural diet. More terrestrial than *Z. macroura*, as reflected in longer tarsus.

Breeding. Virtually nothing known about breeding in the wild. Captives breed in nestboxes placed 1-2.5 m above ground; incubation c. 14 days in warmer climates of S California (e.g. Ventura), but may extend to 17 days in colder parts of N California; fledging 14-20 days.

Movements. Apparently seasonal differences in habitat preference. Formerly abundant in highlands of Socorro I in Jun, when rare in lowlands; common in lowlands in Mar, but only found above 457 m during Nov visit. There appeared to be diurnal rhythms in altitudinal movements too: birds occurring on scrubby SW of the island descended into a green valley each morning and returned in afternoon.

Status and Conservation. **EXTINCT IN THE WILD.** Extirpated in the wild at some stage after Mar 1972, when last observations of wild individuals were made; surveys of Socorro I from Apr 1978 until the present have revealed no birds. Field parties studying the endangered Socorro Mockingbird (*Mimodes graysoni*) have stayed as long as 6 months at a time, scouring all parts of the island, including the heavily wooded north, but have found no sign of the dove. Causes of demise were probably: predation by feral house cats; overhunting, following human settlement of the island in 1957; and overgrazing by sheep which have eradicated the fern and *Croton* understorey. Captive breeding programmes, involving over 200 birds, have been initiated in Germany and California (USA); studbook kept in Frankfurt Zoo, and reintroduction programme planned for late 1990's; cat-removal programme has been initiated by Mexican biologists and Mexican navy, in conjunction with a planned judicious tree-planting project.

Bibliography. Baptista (1987, 1989, 1993, 1996), Baptista & Martínez-Gómez (1996), Baptista *et al.* (1983), Brattstrom & Howell (1956), Collar & Andrew (1988), Collar *et al.* (1994), Gifford (1927), Hellmayr & Conover (1942), Howell & Webb (1995a), Irwin & Miller (1961), Jehl (1983), Jehl & Parkes (1983), McLellan (1926), Nicolai (1991), Ridgway (1916), Rutgers & Norris (1970), Stadler (1997), Stotz *et al.* (1996), Velasco-Murguía (1982), Villa (1960), Wege & Long (1995).

111. Eared Dove

Zenaida auriculata

French: Tourterelle oreillarde

German: Ohrflecktaube

Spanish: Zenaida Torcaza

Other common names: Violet-eared/Blue-eared/Torpedo/Bronze-necked/Gold-neck Dove

Taxonomy. *Peristera auriculata* Des Murs, 1847, Chile.

Formerly placed in genus *Zenaidura*. Forms superspecies with *Z. macroura* and *Z. graysoni*. Eleven subspecies recognized.

Subspecies and Distribution.

Z. a. rubripes Lawrence, 1885 - Lesser Antilles (St Lucia, St Vincent, Barbados, Glover's I, Carriacou and Grenada) and Trinidad, and from C Colombia (Magdalena Valley) through Venezuela (including Margarita I) S to R Orinoco to Guyana and N Brazil (Rio Branco).

Z. a. hypoleuca Bonaparte, 1855 - W Ecuador and Peru.

Z. a. cauae Chapman, 1922 - Cauca Valley in W Colombia.

Z. a. antioquiae Chapman, 1917 - Antioquia, in NC Andes of Colombia.

Z. a. ruficauda Bonaparte, 1855 - E Andes of Colombia and Andes of Mérida, W Venezuela.

Z. a. vinaceorufa Ridgway, 1884 - Curaçao, Aruba and Bonaire.

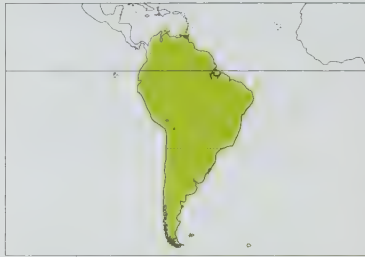
Z. a. jessiae Ridgway, 1888 - few localities on banks of lower Amazon (e.g. Diamantina, near Santarem).

Z. a. marajoensis Berlepsch, 1913 - islands of Marajó and Mexiana in Amazon Estuary.

Z. a. noronha Sharpe, 1890 - NE Brazil, in Maranhão, Piauí and Bahia; Fernando de Noronha Is.

Z. a. virgata Bertonio, 1901 - Bolivia and C Brazil (Mato Grosso, Minas Gerais, São Paulo) S to Uruguay and S Argentina (Chubut) S to Tierra del Fuego.

Z. a. auriculata (Des Murs, 1847) - C Chile (Atacama to Llanquihue) and CW Argentina (near Mendoza and L Nahuel Huapi).



Descriptive notes. Male 22-28 cm, 102-125 g; female 22-26 cm, c. 95 g. Crown and nape bluish grey; rest of head, neck and breast pinkish to purplish buff, shading to buff or cream on belly into undertail-coverts; upperparts olive-brown with black markings on wings; primaries and outer secondaries black with narrow white edges; 2 black facial streaks, 1 behind and the other below the eye, the upper spot is dull black and the lower iridescent blue; iridescent pink or bronzy patch on each side of neck; central tail feathers olive-brown, next pair grey with black central bar, the rest grey with black central bar and terminal white

patch; iris brown to reddish brown; orbital skin bluish or grey; bill dark grey to black; legs and feet red. Female similar but duller; head, neck and underparts less pinkish, occiput less bluish grey, metallic reflections on side of neck less brilliant and extended. Juvenile has wing and tail feathers similar to adults; foreneck and breast dull light buffy brownish, feathers with pale terminal margins; no metallic reflections on side of neck; wing-coverts and scapulars also, with paler margins, lesser and median coverts sometimes with small medio-terminal wedge-shaped streaks of dull white. Races differ in coloration.

Habitat. Inhabits arid to semi-arid scrubland, sometimes with scattered trees or patchy woodland; occurs up to 2000 m, locally to 4400 m in Bolivia, and 3500 m elsewhere in Andes; usually avoids tropical forest. In Argentina, found in thornscrub Chaco region with scattered *Prosopis* and *Acacia* trees. Also found in cultivated fields and pastures, where considered a pest in some regions; common in some large cities, e.g. La Paz. Deforestation in Brazil has created open areas into which this species has spread e.g. in NE Espírito Santo. In Trinidad, occupies mangroves as well as savanna.

Food and Feeding. Detailed studies in Argentina indicate that 85% of diet consists of cultivated seeds, including Sorghum, wheat (*Triticum aestivum*), millet (*Panicum miliaceum*); only small proportion of diet made up of seeds of wild plants, notably grasses *Echinochloa colonum*, *Setaria pampaeana*, *Amaranthus* and *Chenopodium album*; seeds taken in smaller quantities of *Euphorbia* and *Croton*, which sprout after the heavy rains in Nov-Mar, and are a favourite food in Brazil. Species also consumes some maize (*Zea mays*), peanuts (*Arachis hypogaea*) and sunflower (*Helianthus annuus*). Is a major pest to sorghum crops in Venezuela and Colombia.

Breeding. In Argentina Apr-Aug, sometimes to Sept, coinciding with availability of agricultural crops; in Brazil, Apr-Jun; on Trinidad, recorded Dec-Jan and also Mar-Sept. Small stick nest, in Trinidad placed 1-18 m above ground in mangrove or in small tree; in xeric Brazilian habitat, located among macambiras (*Bromelia laciniosa*) and xique-xique cactus (*Pilocereus gounellei*) on sand, protected by the spring vegetation; on Fernando de Noronha I, nests placed on rocks among marine birds; nests on ground at Amazon estuary and along Paraná; in Ecuador and Argentina, nests may be in trees or on ground; in Corrientes (N Argentina), has even been found nesting on roof beam of derelict farmhouse. Generally a solitary nester, but in cultivated regions of Argentina, colonies of up to 1,000,000-5,000,000 birds occur. Does not breed in the same area in consecutive years in Brazil. Usually 2 white eggs (1-3); incubation c. 14 days.

Movements. At intervals of 2-3 years, appears in compact flocks of 1000's in NE Brazil (Piauí, Ceará, Rio Grande do Norte) in Apr-Jun. Nomadic in Argentina. Nesting locations may be used as a post-breeding roost from where birds disperse in search of food; birds have been seen to return to traditional roosting sites even after the trees had been felled, when they may roost on ground or in low shrubs. On Trinidad and Tobago, may gather in post-breeding flocks of 50-100 individuals. Has recently colonised St Lucia, St Vincent and Barbados, with 2 records from Martinique. Occasionally turns up in Fkland Is and on Staten I.

Status and Conservation. Not globally threatened. Still very common to abundant in many areas, locally superabundant. Huge flocks form: in an area of 2,500,000 ha, total of 15-20 roosts found, each containing c. 1,000,000 birds. Serious crop pest in some regions, and flocks of 100,000 birds may descend onto a grain field. Thousands are killed each year as pests in Argentina, or for the table in Brazil. Extent of suitable habitat in N Brazil has been halved since early 1900's; it has been proposed that three reserves be created in NE Brazil, to preserve spectacular migrations; despite huge numbers, potential danger of habitat loss to abundant species should be remembered, bearing in mind the case of extinct *Ectopistes migratorius* (see page 109).

Bibliography. Aguirre (1964, 1973, 1975, 1976, 1977), Antas (1986), Belton (1984), Bond (1985), Bucher (1970, 1974, 1982, 1984, 1989), Bucher & Di Tada (1975), Bucher & Gómez (1977), Bucher & Nores (1973, 1976, 1988), Bucher & Orueta (1977), Bucher *et al.* (1981), Canevari *et al.* (1991), Carman (1979), Contreras *et al.* (1990), Cornejo *et al.* (1981), ffrench (1980, 1991), Fjeldså & Krabbe (1990), Friedmann & Smith (1950), Haverschmidt & Mees (1994), Hellmayr & Conover (1942), Herklots (1961), Hilty & Brown (1986), Humphrey *et al.* (1970), von Ihering (1935), Johnson (1967), Keith (1997), Klimaitis & Moschione (1987), Londono *et al.* (1972), Lord & Yunes (1986), Marchant (1960), Meyer de Schauensee & Phelps (1978), Mursion, Bucher *et al.* (1974), de la Peña (1988, 1995), Ramakka & Ramakka (1979), Rexford & Yunes (1986), Ridgely & Gwynne (1989), do Rosário (1996), Rutgers & Norris (1970), Schubart *et al.* (1965), Short (1975), Sick (1985, 1993), Snyder (1966), Stotz *et al.* (1996), Tostain *et al.* (1992), Voous (1983), Wetmore (1926, 1939), Zimmer (1930).

112. Zenaida Dove

Zenaida aurita

French: Tourterelle à queue carrée **German:** Liebestaube **Spanish:** Zenaida Caribena
Other common names: Pea/Seaside/Wood/Mountain Dove

Taxonomy. *Columba Aurita* Temminck, 1810, Martinique.

Differs from congeners in having 12 (not 14) rectrices, but unquestionably belongs in this genus. Compared with *Z. macroura*, present species has shorter and much less graduated tail, proportionately larger legs and feet; very similar song, but with introductory note less frequency modulated. Race *salvadorii* formerly listed as *yucatanensis*, but merging of genera *Zenaida* and *Zenaidura* made that name unavailable for this taxon. Three subspecies recognized.

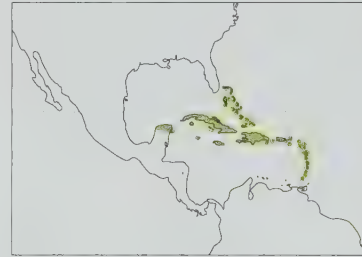
Subspecies and Distribution.

Z. a. salvadorii Ridgway, 1916 - coast of N Yucatán Peninsula and islands of Cozumel, Holbox and Mujeres.

Z. a. zenaida (Bonaparte, 1825) - Bahamas, Cuba and I of Pines, Cayman Is (Grand, Little, Brac) and Jamaica through Hispaniola and Puerto Rico to Virgin Is; formerly Florida Keys.

Z. a. aurita (Temminck, 1810) - Lesser Antilles from Anguilla (N Leeward Is) to Grenada.

Descriptive notes. 28-30.5 cm; male 149-180 g, female 120-145 g. Forehead, sides of neck and head cinnamon-coloured, a little paler and more buffy on the chin, and darker crown; occiput nape and hindneck brownish grey; metallic purple gloss on lateral and lower portions of hindneck; back, scapulars, secondaries and median portion of rump reddish brown; chest and underparts lighter



patches on neck and has buff fringes to all back and wings feathers. Race *zenaida* darker, with terminal band on outermost pair of rectrices bluish grey rather than white, and no white margins to wing spots; *salvadorii* is greyish or olive brown on back and only slightly tinged red, forehead and crown greyish mauve, tips of outer tail feathers greyish white.

Habitat. Usually in lowlands, inhabiting open woodland, forest edge and clearings, as well as cultivated fields, second-growth forest, bushy and scrubby areas, and mangroves. Arboreal in part, nesting and roosting, and taking fruits and seeds; but courts, and glean much of its food, on the ground. In Jamaica, frequents cultivated areas up to 1500 m.

Food and Feeding. Recorded feeding on fruits and seeds of 77 food species in Puerto Rico, of which most important plant species were *Scleria lithosperma*, *Argemone mexicana*, *Croton rigidus*, *Cassia occidentalis*, *Cordia angustifolia*, *Euphorbia heterophylla* and several legume species; some took earthworms, ants and flies. Animal matter comprised only 4-2% of crop contents in 1 study. Also eats salt from deposit-rich soils or livestock mineral blocks; because seed and fruit are low in sodium, ingested salt may meet the needs of egg formation or the production of pigeon milk. Usually solitary, but may form flocks in autumn and may aggregate in food concentrations.

Breeding. Season Mar-Dec in Dominica, May-Aug in Virgin Is; in moist lower montane zone of Puerto Rico, nests throughout year with peak Feb-May (Apr-May in one study), but in SW part of the island (Guánica and Susua forests) peaks in Mar-Jun and Oct-Jan. Nest placed in tree or shrub: in Puerto Rico, 20 tree species recorded, with mango (*Mangifera indica*), royal palm (*Roystonea borinquena*), cactus (*Cephalocereus royerii*), and tall abazia (*Abizia procera*) most commonly used; in Dominica, the most often used tree was *Haemataxylum campechianum*; some nests placed in bromeliads at woodland sites. On islands with few or no predators, nests placed on ground: on Culebra I, nests on boulders 10 m from sea, and land crabs sometimes take heavy toll; on Little Saba Cay (Virgin Is), species uses tunnel-like excavations under matted grass; on Mona I (between Puerto Rico and Hispaniola), nests built on grassy vegetation and in rocky crevices. Usually 2 eggs (1-3); incubation 13-15 days; fledging also 13-15 days. One female bred at 11 months old, and one male performed aerial displays when 10 months old. Three pairs recorded producing up to 4 broods each in a year.

Movements. Generally sedentary. Only present irregularly on Cozumel I, mainly Oct-Dec, where status unclear; vagrant to Alacrán Reef (off N Yucatán).

Status and Conservation. Not globally threatened. Fairly common to common along N coast of Yucatán Peninsula, but rare to uncommon visitor to Cozumel I; also reported from Belize, but this report is now considered unlikely. Status throughout West Indies not well documented, but species has benefited from some prevailing agricultural practices, and has invaded many areas where original vegetation has been cleared; also occurs in some cities, e.g. Bridgetown (Barbados). Species is much appreciated as a game bird, and suffers intense hunting pressure. Race *zenaida* formerly occurred on Florida Keys, but extirpated.

Bibliography. Anon. (1983), Barbour (1943), Barnes (1946), Bent (1932), Biaggi (1983), Bond (1985), Brudenell-Bruce (1975), Baden (1987), Burger, Gochfeld, Gochfeld & Saliva (1989), Burger, Gochfeld, Saliva *et al.* (1989), Danforth (1935), Dod (1987), Emlen (1977), Fleming (1982), Hellmayr & Conover (1942), Howell & Webb (1995a), Keith (1997), Klaas (1968), Maldonado & Pérez-Rivera (1977), Moreno-Brillón *et al.* (1986), Nellis *et al.* (1984), Pérez-Rivera (1976), Raffaele (1989), Rivera-Milán (1992, 1995b, 1996), Robertson (1978c), Rutgers & Norris (1970), Stotz *et al.* (1996), Terres (1982), Wauer (1996), Wetmore (1927), Wetmore & Swales (1931), Wiley (1985c, 1991a), Zamore (1981).

113. Galapagos Dove

Zenaida galapagoensis

French: Tourterelle des Galapagos **German:** Galapagostaube **Spanish:** Zenaida de Galápagos

Taxonomy. *Zenaida Galapagoensis* Gould, 1839, Galapagos Archipelago.

Sometimes separated in monospecific genus *Nesopelia*; has proportionally shorter tail, larger legs and feet, and longer bill than *Z. macroura* and *Z. autilculata*; however, *Z. aurita* appears to be intermediate between present species and other members of genus in the above characters and colour patterns; nevertheless, present species has very different calls and displays from all other *Zenaida* and, given the conservative nature of dove displays, its isolation in a separate genus may be appropriate. Two subspecies recognized.

Subspecies and Distribution.

Z. g. exsul (Rothschild & Hartert, 1899) - Culpepper (Darwin) and Wenman (Wolf) in N Galapagos. *Z. g. galapagoensis* Gould, 1839 - major islands of Galapagos (except Culpepper and Wenman).



Descriptive notes. 18-23 cm; 88 g. Head and neck dark reddish brown; pinkish brown on breast lightening to buffish on the belly; undertail-coverts pale grey; orbital skin cobalt-blue to violet-blue surrounded by border of black; white stripe bordered by two thin black stripes on face below and behind eye; pink and bronze iridescent patch on side of neck; upperparts dark brown; scapulars and most of wing-coverts black laterally with white median streak; distal wing streaked and spotted appearance; distal coverts with outer web white, producing a white patch on folded wing; primaries black fringed with narrow white

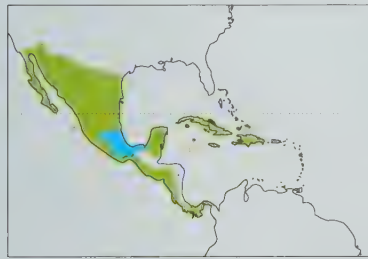
buff-brown; distal wing-coverts, alula, primary coverts and sides of rump grey; large rounded black spots on proximal secondaries and larger wing-coverts; outer secondaries dusky edged with grey which merges into white; dark violet-blue streaks above and below ear-coverts; these streaks appear black from a distance; central tail feathers reddish brown, lateral rectrices grey with rufous outer webs; outermost pair grey with rufous outer web and white terminal band; black subterminal tail bar; bill black; feet and legs red; iris dark brown to brownish black. Female paler with back less reddish. Juvenile resembles female but lacks iridescent

Habitat. Dry, rocky lowlands with scattered trees, bushes and *Opuntia* cacti.
Food and Feeding. During wet season, late Jan to mid-Feb, feeds on caterpillars and *Opuntia helleri* blossoms; at other times, mainly forages on ground for *Croton scouleri* seeds. Long, decurved bill is effective digging tool, and used to uncover seeds of *Merremia aegyptica*, *Ipomoea linearifolia* and *Opuntia echios* in Dec; some seeds of *Tribulus cistoides* are also taken. Also feeds on cactus pulp, and suspected to take fly larvae and pupae found in *Opuntia* pads and trunks. There appears to be some geographical variation in feeding habits: birds on Wenman I clambered on *Opuntia* pads to consume flowers, but individuals on Pinta, Daphne and Genovesa were never observed to do so.
Breeding. Can occur Jan-Nov, but season varies locally from island to island; active nests have been found on Española during most months; in detailed study on Genovesa, breeding activity did not commence until early Feb, following onset of rain, and continued for at least 4 months. Nest may be placed on the ground, in rock cavities or in old Galapagos Mockingbird (*Nesomimus parvulus*) nests, averaging 75 cm above ground; equal numbers of nests on ground and above it, but ground nests predated more than those in old mockingbird nests. Some pairs bred twice in same season. Almost invariably 2 eggs (1-3); incubation 13 days; fledging 13-17 days; known to perform distraction display. Captive birds renested 6-10 days after young had fledged.
Movements. Not well known, but birds seen flying between islands.
Status and Conservation. Not globally threatened. Appears to be relatively secure away from settled areas and on islands free of predators. Rare on some islands, e.g. Santa Maria, San Cristóbal, Santa Cruz; common on others, e.g. Fernandina, San Salvador, Santa Fè, Española and Genovesa, where feral cats are few or absent. Quite tame, as is typical of island species; early buccaneers reported that the birds would gather in clusters around humans and even sat on their heads, so humans could approach and kill them for food with sticks; one report that 60-70 birds could be killed before noon with a stick. As late as 1965, 9000 doves were eaten by 10 men in 3 months. Species is now less tame near human habitation. Population on Baltra extirpated by armed forces of USA during Second World War.
Bibliography. Anon. (1997c), Beebe (1924), Gifford (1913, 1931), Grant (1982), Grant & Grant (1979), Harris (1973, 1982), Hellmayr & Conover (1942), Lack (1950), Lévêque (1964), Nicolai (1962, 1969), Peterson (1967), Prestwick (1959), Probsting (1959), Ridgway (1916), Rutgers & Norris (1970), Stotz *et al.* (1996), Swarth (1931), Thornton (1971).

114. White-winged Dove
Zenaida asiatica

French: Tourterelle à ailes blanches **German:** Weißflügeltaube **Spanish:** Zenaida Aliblanca
Other common names: Singing/Mesquite Dove, White-wing

Taxonomy. *Columba asiatica* Linnaeus, 1758, Jamaica.
Probably more closely related to *Columba* than to most other members of *Zenaida*, but tentatively retained in this genus at present. Often considered conspecific with *Z. meloda*, but important differences in vocalizations and morphology. Validity of race *australis* requires critical evaluation; coloration highly variable, and birds from Veracruz and Costa Rica were found to be indistinguishable. Three subspecies recognized.
Subspecies and Distribution.
Z. a. mearnsi (Ridgway, 1915) - Baja California, S Arizona and New Mexico S to Guerrero and Puebla (SC Mexico); also Tres Marias Is (off CW Mexico).
Z. a. asiatica (Linnaeus, 1758) - lower Rio Grande Valley (Texas) S to Isthmus of Tehuantepec, S on both slopes through Guatemala, Honduras and El Salvador to Nicaragua; also S Bahamas through Cuba, Jamaica and Hispaniola to Puerto Rico; Grand Cayman, San Andrés and Providencia.
Z. a. australis (J. L. Peters, 1913) - W Costa Rica to W Panama.



Descriptive notes. Male 27-31 cm, female 25-29.5 cm; 125-187 g. Forehead, face, neck and breast buff, throat whitish; crown, nape and hindneck mauve pinkish; small black spot below and behind each eye; iridescent bronze patch behind spot; mantle, wings and central tail feathers reddish drab; ends of outer wing-coverts white, forming conspicuous white band on closed wing; primaries and outer secondaries black, the latter white-tipped and forming a second white patch on the folded wing; lower back and rump grey; outer tail feathers grey with black subterminal bar followed by broad white terminal band; iris orange or red; orbital skin blue; bill black, legs and feet red. Sexes similar. Juvenile paler and greyer; metallic gloss on neck absent; indistinct pale shaft streaks on feathers of foreneck and upper breast. Race *mearnsi* larger and paler; *australis* said to be darker than nominate, but much individual variation.
Habitat. Typically inhabits arid tropical scrub, tropical deciduous woodland and cacti-palo-verde desert from sea-level to 2500 m. In Rio Grande Delta, occupies thorn-studded ebony (*Pithecellobium flexicaule*) woodland mixed with leguminous trees, but much ebony has now been cut down throughout its range; mesquite (*Prosopis*) woodland is principal habitat today, followed by huisache (*Acacia farnesiana*) woodland and citrus groves. Race *mearnsi* can be found in woodland close to water and habitat characterized by mesquite, acacias, cacti, palo verde (*Cercidium*) and desert willow (*Chilopsis linearis*); some Arizona populations may range into chaparral where shrubs seldom reach 2 m high; also found in turbinella oak (*Quercus turbinella*) and emory oak (*Q. emoryi*) woodland with scattered stands of manzanita (*Arctostaphylos*) and mountain mahogany in canyon bottoms. However, SW desert is most important habitat for *mearnsi* which tolerates air temperatures of 46°C, when other animals are in hiding; this habitat characterized by cacti and palo verde with scattered creosote bush (*Larrea tridentata*), mesquite and salt-brush (*Sarcobatus*); desert of cacti and palo verde ranges from 500 to 1200 m and occasionally 1500 m. In Guatemalan highlands, inhabits highland forests, at 2000-2700 m. West Indian populations occupy mangrove swamps at sea-level to high mountain forests; black mangrove (*Avicennia nitida*), which occurs in drier habitat than other mangroves, is preferred. Migratory populations from W winter in habitats with mesquite,

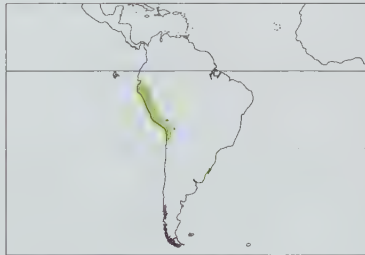
acacias, cassias and columnar cacti; those of E in tropical deciduous and thorn forests, foothills, and coastal mangroves in Guatemala, Honduras and El Salvador.
Food and Feeding. Mainly seeds, but also takes mast and fruit; seeds include wild millet (*Echinochloa crus-galli*), crabgrass (*Digitaria*), rye (*Lolium*) and canary grass (*Phalaris*). Late in breeding season, feeds extensively on domestic grains such as hegari, milo, redtop cane, barley, wheat, corn and rice. Also takes seeds of wild doveweed (*Croton*), leatherweed (*Jatropha spathula*), oak mast, sunflower, catclaw (*Acacia*, *Zenthoxylum fagara*), various legumes, cactus fruit, prickly poppy (*Argemone*), nightshade and desert willow.
Breeding. N populations breed in spring and summer; further S less seasonal. In W of range, builds typical flimsy dove stick nest, placed on crotches of saguaro (*Carnegiea gigantea*), palo verde, ironwood (*Olneya tesota*) and especially mesquite; in lower Rio Grande Valley, horizontal branches of thorny trees, including ebony, coma (*Bumelia angustifolia*) and granjeno (*Celtis pallida*). Race *mearnsi* is mostly a solitary nester, although a few do nest in colonies; in contrast, nominate race nests in large, densely populated colonies; genetic interchange between colonies does occur. Normally 2 creamy white to creamy buff eggs, sometimes 1, occasionally 3; clutches of 4 eggs due to 2 females laying in same nest; incubation c. 14 days; fledging 13-16 days in undisturbed nests; at 11-12 days, nestlings capable of horizontal flight if disturbed; at 15 days, capable of flying over distances of c. 10 m.
Movements. Migratory in N, resident in S. Races of W & E North America winter in different regions: W birds winter in Pacific coastal plains and foothill valleys of W Mexico in Colima, Jalisco, Michoacán and Guerrero, whereas Arizona birds winter mainly in Pacific plains and foothills of Sinaloa, Guerrero and Oaxaca; birds from Rio Grande Valley and from Nuevo León and Tamaulipas fly S across Isthmus of Tehuantepec to winter on Pacific slopes of Honduras, Nicaragua and Costa Rica (to Guanacaste).

Status and Conservation. Not globally threatened. Much habitat has been lost throughout its range. By 1965, it was estimated that c. 95% of native breeding habitat had been lost, most of it cleared for agriculture; this, and excessive hunting pressure, caused numbers to plummet. Habitat acquisition and strict hunting seasons have resulted in Texas populations stabilizing at c. 530,000 breeding birds in 1967-1981. A study conducted in Tamaulipas (NE Mexico) in mid- to late 1960's indicated local population of c. 3,100,000-3,400,000 breeding individuals. History has shown that this species is sensitive to habitat destruction: much ebony forest has been felled throughout range of species, and only scattered stands remain in Tamaulipas, Veracruz and San Luis Potosí.
Bibliography. Acosta & Torres (1984b), Alama (1970), Aldrich (1981), Ayala-Guerrero & Vasconcelos-Duenas (1988), Biaggi (1983), Binford (1989), Blankinship *et al.* (1972), Brown (1980), Brown & Smith (1976), Buden (1987), Conti & Forrester (1981), Conti *et al.* (1985), Cottam & Trefethen (1968), Cunningham (1985), DeGraaf & Rappole (1995), Elder (1956), Emlen (1974, 1979), Fulbright *et al.* (1992), Gallucci (1978), George (1993), George *et al.* (1994), Gibson & Kessel (1992), Haughey (1986), Hayslette *et al.* (1996), Hellmayr & Conover (1942), Howell & Webb (1995a), Irwin (1975), Jehl & Everett (1985), Jenks (1983), Kiel & Harris (1956), Land (1970), Lever (1987), MacMillen & Trost (1966), Merz (1963), Miller (1985), Monroe (1968), Nichols *et al.* (1986), Olin *et al.* (1989), Price *et al.* (1995), Purdy (1976, 1983), Purdy & Tomlinson (1991), Raffaele (1989), Raitt & Maze (1968), Rappole & Waggenerman (1986), Rappole *et al.* (1993), Ridgely & Gwynne (1989), Rivera-Milán (1992, 1995b, 1996), Robinson & Redford (1991), Root (1988), Rowley (1984), Rutgers & Norris (1970), Saunders, G.B. (1980), Schacht (1993), Schacht *et al.* (1995), Slud (1964), Small, A. (1994), Small, M.F. *et al.* (1993), Stair (1970), Stiles & Skutch (1989), Stotz *et al.* (1996), Strong & Bock (1990), Swanson (1989), Swanson & Rappole (1992a, 1992b, 1993, 1994), Szaro (1981), Szaro & Jakle (1985), Tacha, Braun & Tomlinson (1994), Tacha, Schacht *et al.* (1994), Terborgh & Faaborg (1973), Viers (1970), Waggenerman (1972), West (1993), West *et al.* (1993), Wetmore (1968), Wetmore & Swales (1931), Wigal (1973), Zammuto (1986).

115. Pacific Dove
Zenaida meloda

French: Tourterelle côtière **German:** Perutaube **Spanish:** Zenaida Peruana
Other common names: Southern White-wing Dove

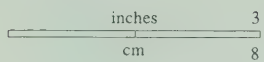
Taxonomy. *Columba meloda* Tschudi, 1843, Peru.
Probably more closely related to *Columba* than to most other members of *Zenaida*, but tentatively retained in this genus at present. Often considered conspecific with *Z. asiatica*, but important differences in vocalizations and morphology. Monotypic.
Distribution. Pacific coast of South America from SW Ecuador to N Chile (Arica S to Coquimbo).



Descriptive notes. c. 25-33 cm; c. 216 g. Paler and greyer than *Z. asiatica*; lacks pink tinge on crown, and nape, and this is replaced by grey; buff face and neck replaced by grey; grey tips to tail feathers; bill stouter than in *Z. asiatica*; iris greyish brown, rather than red; orbital skin bright blue; song similar to that of *Columba cayennensis*. Sexes similar.
Habitat. Coastal valleys and plains, and arid open savanna; frequents city parks in Arica, N Chile. Occasionally found up to 2000 m in Peru.
Food and Feeding. No precise information available, but probably similar in habits to *Z.*

asiatica.
Breeding. In SW Ecuador, breeds as scattered pairs, never in colonies. Lays 2 eggs, white rather than buffish as in *Z. asiatica*.
Movements. No information.
Status and Conservation. Not globally threatened. No population or census data available from Ecuador or Peru, but in Chile species is rapidly expanding its range S, and has recently been found to breed near Coquimbo.
Bibliography. Cottam & Trefethen (1968), Hellmayr & Conover (1942), Howell & Webb (1995b), Johnson (1967), Koepcke (1970), Lever (1987), Marchant (1960), Ridgway (1916), Stotz *et al.* (1996), Tubaro & Mahler (1998).

PLATE 11



Genus *COLUMBINA* Spix, 1825

116. Common Ground-dove

Columbina passerina

French: Colombe à queue noire **German:** Sperlingstäubchen **Spanish:** Columbina Común
Other common names: Scaly-breasted/Scaled/Spotted/Rosy Ground-dove, Sparrow/Passerine/Tobacco Dove

Taxonomy. *Columbina passerina* Linnaeus, 1758, South Carolina, USA. Formerly placed in genus *Columbigallina*. Closely related to *C. minuta*. Eighteen subspecies recognized.

Subspecies and Distribution.

- C. p. passerina* (Linnaeus, 1758) - South Carolina along Atlantic and Gulf Coasts to SE Texas.
- C. p. pallascens* (Baird, 1860) - Colorado Delta and Baja California E through S Arizona to S Texas, and S through Mexico to Belize and Guatemala.
- C. p. socorroensis* (Ridgway, 1887) - Socorro I in Revillagigedo Archipelago (off W Mexico).
- C. p. neglecta* (Carraker, 1910) - Honduras to Costa Rica and Panama.
- C. p. bahamensis* (Maynard, 1887) - Bermuda and Bahamas (except Inagua Is).
- C. p. exigua* (Riley, 1905) - Great Inagua I (S Bahamas) and Mona I (between Puerto Rico and Hispaniola).
- C. p. insularis* (Ridgway, 1888) - Cuba, I of Pines, Cayman Is (Grand, Little, Brac), Hispaniola and adjacent islands.
- C. p. jamaicensis* (Maynard, 1899) - Jamaica.
- C. p. navassae* (Wetmore, 1930) - Navassa I (off SW Hispaniola).
- C. p. portoricensis* (Lowe, 1908) - Puerto Rico, Culpebras, Vieques and Virgin Is (except St Croix).
- C. p. nigrirostris* (Danforth, 1935) - St Croix and N Lesser Antilles.
- C. p. trochila* (Bonaparte, 1855) - Martinique.
- C. p. antillarum* (Lowe, 1908) - S Lesser Antilles from St Lucia and Barbados S to Grenada.
- C. p. albivitta* (Bonaparte, 1855) - coastal N Colombia and Venezuela S to Orinoco Valley, with offshore islands from Aruba to Los Testigos, Margarita I and Trinidad.
- C. p. parvula* (Todd, 1913) - C Colombia in upper Magdalena Valley.
- C. p. nana* (Todd, 1913) - W Colombia in Cauca Valley and arid upper Dagua Valley.
- C. p. quitensis* (Todd, 1913) - C Ecuador from R Guallabamba S to Riobamba.
- C. p. griseola* Spix, 1825 - extreme S Venezuela, the Guianas and Amazonia from R Negro and R Madeira E to coastal Brazil (S to Bahia).

Descriptive notes. Male 16-18 cm, 24-37 g; female 15-18 cm, 22-42 g. One of the smallest of all doves, only slightly larger than House Sparrow (*Passer domesticus*). Forehead, face, sides of neck, breast and underparts pinkish brown or silvery pink; crown, nape and hindneck grey to greyish pink, feathers on breast and sides of neck with dark centres, others with dark edges, giving scaly appearance; upperparts greyish brown or greyish fawn; wing-coverts and outer secondaries with iridescent black or dark blue spots on background of grey or pinkish; primaries chestnut with blackish outer webs and tips; chestnut underwing and axillaries; central tail feathers brown or grey, outer tail feathers black with white tips; undertail-coverts

greyish brown with pale tips or white with faint dark centres; iris red, brownish red, orange or pinkish; bill black, red, orange or yellow, pink at base with black tip; feet pink. Female duller, with less grey on head; wing spots may be purplish brown or dull chestnut. Juvenile similar to female but with pale buff edges to feathers and fainter dusky breast markings; young male has hint of pink on neck. Races differ in bill colour or shades of brown, as well as amount of white in tail.

Habitat. Inhabits drier areas and open habitat, notably savanna, pastures, and sandy openings in woods. Frequent in cultivation, villages and towns, occurring commonly on lawns. Roosts and perches in trees. From sea-level up to 2500 m in Central America; up to 2900 m in central valley of Ecuador. May flock with *Scardafella inca* and *C. talpacoti*.

Food and Feeding. Poorly known. Consumes grass seeds, berries and occasionally insects. Will also take bread and other scraps of human food. Often seen on roadsides taking grit. Forages exclusively on ground; usually in pairs or small groups.

Breeding. Breeding apparently dictated by food supply and consequently timing varies through range; nests found in Jan-Nov in Trinidad, but peak May-Jun; all months except Jan in Cuba; May-Jul in Dominican Republic; mainly spring and summer in St Lucia; all year round, but mainly Jan-Sept in Costa Rica; Feb-Nov in USA; probably throughout year in El Salvador. Nest is shallow saucer or pad of fine grasses or rootlets, sometimes a cup of twigs, on ground beneath grass tussock or sheltering shrub; occasionally in shrubs or trees up to 9 m; most nests in Trinidad in trees, and in Cuba usually in citrus trees. Usually 2 white faintly glossy eggs (1-3), possibly 4 in USA; incubation 13-14 days by both sexes; nestlings altricial, with sparse, coarse, hair-like grey down; young may fly at 11 days. In Texas birds bred when only 79 days old. Longevity of one ringed individual was 6 years.

Movements. Generally resident. N American birds tend to move S in winter, although species wanders irregularly N to Oregon and New York in autumn and winter.

Status and Conservation. Not globally threatened. Generally uncommon to locally abundant; common to fairly common throughout broad range in Mexico; locally common in Colombia where occurs mainly in lowlands. Perhaps in great part due to very small size, rarely persecuted by humans and in consequence often rather approachable; apparently adaptable to many man-altered habitats.

Bibliography. Barbour (1923, 1943), Bent (1932), Biaggi (1983), Binford (1989), Brudenell-Bruce (1975), Buden (1985, 1987), Burger (1992), Carvalho (1957), Cherrie (1916), Dunn & Garrett (1990), Emlen (1977), Engleman (1980), ffrrench (1980), Fjeldsá & Krabbe (1990), Graves & Zusi (1990), Hailman (1989), Harrison (1978), Haverschmidt & Mees (1994), Hellmayr & Conover (1942), Herklots (1961), Hilty & Brown (1986), Hopkins (1983), Howell & Webb (1995a), Jackson & Jackson (1985), Jones, M.T. (1988), Jones, M.T. & Mirarchi (1989,

1990), Keith (1997), Land (1970), Landers & Buckner (1979), Landers *et al.* (1977), Meyer de Schauensee & Phelps (1978), Monroe (1968), Nicholson (1937), Passmore (1981, 1984), Pérez-Rivera (1987), Price *et al.* (1995), Raffaele (1989), Ridgely & Gwynne (1989), Rivera-Milán (1992, 1995b, 1996), Root (1988), Rowley (1984), Rutgers & Norris (1970), Schubart *et al.* (1965), Schwartz (1970b), Sick (1985, 1993), Skutch (1964), Slud (1964), Small (1994), Snyder (1966), Stiles & Skutch (1989), Stotz *et al.* (1996), Tostain *et al.* (1992), Voous (1983), Wetmore (1939), Wetmore & Swales (1931), Willoughby (1966), Young (1928).

117. Plain-breasted Ground-dove

Columbina minuta

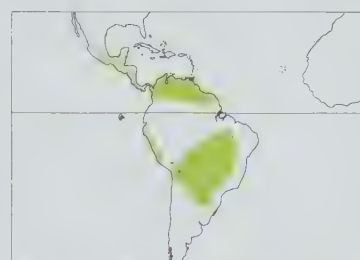
French: Colombe pygmée **German:** Zwergtäubchen **Spanish:** Columbina Menuda
Other common names: Plain/Grey/Little Ground-dove, Pygmy Dove

Taxonomy. *Columbina minuta* Linnaeus, 1766, Cayenne.

Formerly placed in genus *Columbigallina*. Closely related to *C. passerina*; the two overlap in range in some areas. Race *amazilia* doubtfully distinct from nominate. Four subspecies currently recognized.

Subspecies and Distribution.

- C. m. interrupta* (Griscom, 1929) - S Mexico (S Veracruz, Tabasco, Campeche, Guerrero and locally Jalisco), S Guatemala and Belize to Nicaragua.
- C. m. elaeodes* (Todd, 1913) - Costa Rica S through E Panama and Canal Zone to WC Colombia.
- C. m. minuta* (Linnaeus, 1766) - Venezuela E to Trinidad and the Guianas, and S through E Colombia to Peru (Urubamba Valley), E & C Brazil and Bolivia, and on to SC Paraguay and NE Argentina (Misiones).
- C. m. amazilia* (Bonaparte, 1855) - arid coastal regions of SW Ecuador and Peru (Lima to Libertad).



Descriptive notes. Male 14-15 cm, female 14-16 cm; 26-42 g. Very similar in coloration and markings to *C. passerina* but lacking scaling on head and breast, and even smaller; rufous on primaries less extensive, confined to inner webs; redder feet. Forehead, crown and nape bluish grey; face and throat pinkish, darkening on breast and underparts; undertail-coverts white with grey centres; iris yellow, yellow-brown or orange; bill grey or brown; legs and feet pink to red. Female paler. Immature like female, but mantle scaled narrowly with buff and chest with cinnamon, and wing-covert spots blackish. Races differ mainly in

coloration: *elaeodes* darker than nominate.

Habitat. Lowlands, in arid sandy areas with scrub, second growth and cultivated areas in Central and South America; also found in savanna and grassy fields; in Colombia, particularly in brushy ecotone between woodland and grassland. Occasionally perches low in bushes. In Central America found from sea-level up to 750 m, but regular to 1400 m in South America and occasionally to 2100 m in Peru.

Food and Feeding. Very little known, but appears to feed mainly on grass seeds. Forages in pairs or singly, rarely in flocks of up to 10-15 birds.

Breeding. Suspected to be circumannual breeder in Costa Rica, mainly May-Jul in Pacific NW, and Jan in Parrita; Mar-Sept in Trinidad, with peak in Jun; in Panama, nests found Mar-Jun. Nests similar to those of *C. passerina* but smaller; in Trinidad, nest often placed on a pad of feathers; nests on ground or up to 9 m above ground in tree or shrub. Clutch 2 white eggs; incubation 13-14 days.

Movements. Resident throughout range.

Status and Conservation. Not globally threatened. Extensive range, within which species is fairly common to common in parts, e.g. locally in Colombia; local in much of Central America; rare in some areas, e.g. Trinidad. Appears to be locally in recession, since *C. passerina* may be replacing it in some areas where the two are sympatric.

Bibliography. Astley (1900), Belcher & Smoother (1936), Binford (1989), Canevari *et al.* (1991), ffrrench (1980), Fjeldsá & Krabbe (1990), Friedmann (1948b), Haverschmidt & Mees (1994), Hayes (1995), Hellmayr & Conover (1942), Herklots (1961), Hilty & Brown (1986), Howell & Webb (1995a), Land (1970), Meyer de Schauensee & Phelps (1978), de la Peña (1988), Ridgely & Gwynne (1989), Rutgers & Norris (1970), Schubart *et al.* (1965), Short (1975), Sick (1985, 1993), Slud (1964), Snyder (1966), Stiles & Skutch (1989), Stotz *et al.* (1996), Tostain *et al.* (1992), Wetmore (1968), Zimmer (1930).

118. Ecuadorian Ground-dove

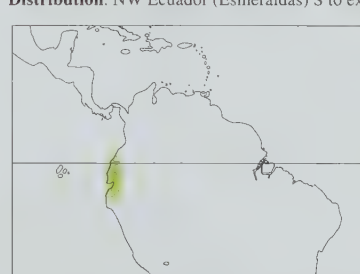
Columbina buckleyi

French: Colombe de Buckley **German:** Blaßtäubchen **Spanish:** Columbina Ecuatoriana
Other common names: Buckley's Ground-dove

Taxonomy. *Chamaepelia buckleyi* P. L. Sclater and Salvin, 1877, Santa Rita, Ecuador.

Formerly placed in genus *Columbigallina*. Forms a superspecies with *C. talpacoti*. Monotypic.

Distribution. NW Ecuador (Esmeraldas) S to extreme NW Peru (Tumbes).



Descriptive notes. 18 cm; c. 57 g. Forehead and face greyish pink darkening on breast and underparts to deep mauve pink; crown and nape bluish grey; upperparts brownish grey, wing-coverts pinkish grey and spotted as in *C. talpacoti*; black primaries and outer secondaries; central tail feathers grey, the rest black with white tips on the outermost; black underwing. Female browner with less pink flush. Juvenile brown with pale edges or centres of feathers.

Habitat. Arid tropical zone, in scrubby second growth and deciduous woodland, occurring up to 1000 m.

Food and Feeding. No information available.

Probably feeds mainly on small seeds, like congeners.

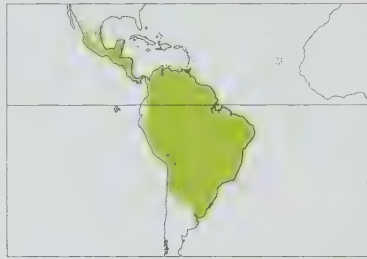
Breeding. Virtually nothing known. Captive birds reported to build very substantial nests.
Movements. None known, but in Bosque Nacional de Tumbes, NW Peru, only recorded in Jun-Jul and not seen during fieldwork in Feb-Mar.
Status and Conservation. Not globally threatened. Occurs only in the Tumbesian Endemic Bird Area, within which it is considered to be fairly common, and thought to be relatively secure. Nevertheless, very small range and almost total lack of information regarding biology indicate that at least some basic research is highly desirable.
Bibliography. Berndsen (1984), Best & Clarke (1991), Best & Kessler (1995), Chapman (1926), Hanover (1969), Hellmayr & Conover (1942), Parker, Parker & Plenge (1982), Parker, Schulenberg *et al.* (1995), Rösler (1996), Short (1975), Stotz *et al.* (1996), Williams & Tobias (1994).

119. Ruddy Ground-dove

Columbina talpacoti

French: Colombe rousse **German:** Rosttäubchen **Spanish:** Columba Colorada
Other common names: Talpacoti/Cinnamon/Stone Dove, Blue-headed Ground-dove

Taxonomy. *Columba Talpacoti* Temminck, 1811, South America. Formerly placed in genus *Columbigallina*. Forms a superspecies with *C. buckleyi*. Four subspecies recognized.
Subspecies and Distribution.
C. t. eluta (Bangs, 1901) - Pacific coast of Mexico from N Sinaloa to Chiapas.
C. t. rufipennis (Bonaparte, 1855) - EC Mexico (C Veracruz) through Central America to Colombia and N Venezuela, as well as Margarita I, Trinidad and Tobago.
C. t. cauae (Chapman, 1915) - Cauca Valley of W Colombia.
C. t. talpacoti (Temminck, 1811) - E Ecuador and NW & E Peru E to the Guianas, and S through Bolivia, Paraguay and Brazil (S to Rio Grande do Sul) to Uruguay and N Argentina (S to Buenos Aires); non-breeding visitor to C Chile, including Lake District.



Descriptive notes. Male 15-18 cm, 40-56.5 g; female 14-18 cm, 35-51 g. Forehead, crown and nape grey; face and throat pinkish; rest of plumage pinkish chestnut; black spots on wings; primaries black, with some rufous on inner webs; undertail-coverts dark rufous; central tail feathers brown, outer ones black with pinkish chestnut tips; iris dark brown with outer ring of red; bill brown to black; legs and feet pink. Female duller and paler. Race *rufipennis* paler and has chestnut primaries and secondaries; *eluta* even paler.

Habitat. Prefers humid areas; lightly wooded semi-open country, riparian thickets, marshes,

scrubby second growth, forest edge, cultivated areas and towns. Avoids interior of woods but may invade clearings. In Costa Rica, occurs up to 1400 m near Cartago; locally to 1200 m on Pacific slope; occasionally to 2600 m in Colombia.

Food and Feeding. In one detailed study in Brazil, found to eat seeds of range 2-15 mm in length; main food items were seeds of the introduced grass *Brachiaria plantaginea* and the native *Paspalum convexus*; also takes spilled grain, bread crumbs and other human food; 2 insects and 1 snail found in one crop. Feeds on ground in open areas; usually in pairs or flocks of 10-20; flocks of over 200 individuals sometimes observed; may form mixed flocks with *Scardafella inca* and *C. passerina*.

Breeding. In Trinidad, and probably El Salvador and Brazil, breeds in all months; Jan-Sept in Costa Rica; Apr-Nov in Colombia. In one study in Brazil, 218 nests were found from ground level up to 7.5 m up in a tree; nest flat, elliptical shell of grasses or, more rarely, roots, lined with finer materials; may use old nest of other bird species; sometimes nests in cities, on beams under tiles and on porches, e.g. in Rio de Janeiro. Clutch usually 2 white eggs, occasionally 1; incubation 11-13 days; fledging usually 11-13 days (10-14). Adults may use same nest for a second or third brood; interval between broods varies at 2-33 days; one nest in Trinidad was used for 5 consecutive broods.

Movements. Resident throughout much of its range, although apparently undertakes irregular movements to SW USA in winter, turning up in S California, S Arizona, New Mexico and S Texas; apparently seasonal occurrence in C Chile may also point to some form of regular movement. Several extralimital records, e.g. in Netherlands Antilles and Uruguay, indicating some irregular movements, perhaps dispersal of a portion of population.

Status and Conservation. Not globally threatened. Common to abundant in Colombia, but local in Amazonia, where probably expanding range as result of forest destruction; common to fairly common in Mexico and Central America. Generally appears to adapt reasonably well to a series of man-altered habitats, and has probably benefited locally from human activities; has successfully expanded into cities, notably in SE Brazil.

Bibliography. Arballo (1990), Belton (1984), Binford (1989), Canevari *et al.* (1991), Carvalho (1957), Chebez (1992), Cintra (1988), Cintra *et al.* (1990), Contreras *et al.* (1990), Darrieu (1994), Dunn & Garrett (1990), French (1980), Haverschmidt (1953), Haverschmidt & Mees (1994), Hellmayr & Conover (1942), Herklots (1961), Hilty & Brown (1986), Howell & Webb (1995a), Johnson (1967), Land (1970), Meyer de Schauensee & Phelps (1978), Mitchell (1957), Monroe (1968), Narosky & di Giacomo (1993), Oniki & Willis (1983), de la Peña (1988, 1996), Ridgely & Gwynne (1989), do Rosário (1996), Rutgers & Norris (1970), Schubart *et al.* (1965), Shifflett (1975), Short (1975), Sick (1985, 1993), Skutch (1956), Slud (1964), Small (1994), Snyder (1966), Stiles & Skutch (1989), Stotz *et al.* (1996), Tostain *et al.* (1992), Wetmore (1939, 1957, 1968).

120. Picui Dove

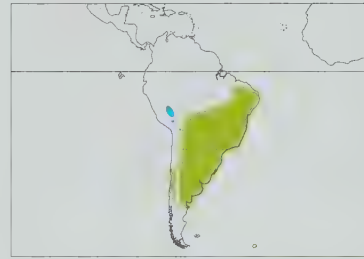
Columbina picui

French: Colombe picui **German:** Picuitäubchen **Spanish:** Columba Picuí
Other common names: Long-tailed/White-winged Ground-dove, Steel-barred Dove

Taxonomy. *Columba Picui* Temminck, 1813, Paraguay. Plumage pattern similar to *C. cruziana*, which is probably its closest relative. Two subspecies recognized.

Subspecies and Distribution.
C. p. strepitans Spix, 1825 - NE Brazil in Maranhão, Piauí, Ceará and Bahia.
C. p. picui (Temminck, 1813) - Bolivia, Paraguay and S Brazil S to Uruguay, S Argentina (Chubut) and C Chile; winters N to E Peru.

Descriptive notes. 18 cm; 45-59 g. Forehead and throat whitish, narrow black stripe across lores; crown and nape grey becoming brownish grey on mantle, back, rump, uppertail-coverts and central



rectrices, inner wing coverts and secondaries; central wing-coverts pinkish fawn; iridescent blackish blue stripe across wing-coverts and another over tertials; white band visible on closed wing formed by white edges to wing-coverts primaries and primary coverts black; neck and breast pinkish grey becoming white on belly and undertail-coverts; iris grey; bill dark grey; legs and feet violet to pinkish. Female slightly duller with less clear pinkish tones. Juvenile duller and browner with pale fringes to most feathers and reddish buff or buff centres to most wing-coverts and breast feathers.

Habitat. Mainly found in arid country; forest edge and savanna with open grassland, scattered trees and other cover. In Andes, found in open *Prosopis* scrub forest. Enters suburban areas, gardens and cultivated areas, often favouring recently burnt or ploughed areas. Occurs in lowlands and up to 3000 m in Jujuy, NW Argentina. Abundant in Yungas of Bolivia, as high as 2500 m and seasonally to 3700 m; up to 3000 m in Cochabamba, and 3500 m in La Paz city, but rarely above 1250 m throughout most of the rest of its range.

Food and Feeding. Food consists largely of seeds, including cultivated grains, e.g. sorghum. Feeds on ground, often in small groups of up to 25-30 birds; may gather in 100's in hemp fields.

Breeding. Season Oct-Apr in Argentina. Nest of twigs, lined with finer materials in shrub or tree. Clutch of 2 white eggs; both sexes apparently incubate. Probably raises 2 broods.

Movements. Believed to be migrant, e.g. regular non-breeding visitor to E Peru in winter. Birds found occasionally at 3700 m in Yungas of Bolivia are believed to be migrants. Extralimital record in Colombia.

Status and Conservation. Not globally threatened. Virtually no information available on status, but species appears to be abundant in places e.g. in dry Chaco of NW Argentina; widespread in lowlands of NC Chile. Perhaps in part due to small size, species is rarely hunted.

Bibliography. Araya & Chester (1993), Belton (1984), Bond (1955), Canevari *et al.* (1991), Contreras *et al.* (1990), Dunning (1982), Fjeldså & Krabbe (1990), Hellmayr & Conover (1942), Hilty & Brown (1986), Johnson (1967), Klimaitis & Moschione (1987), Krabbe *et al.* (1996), Nadal (1994), Narosky & di Giacomo (1993), Nellar (1993), Nores *et al.* (1983), O'Neill (1969), Pearson (1975a), de la Peña (1988, 1995), Rocha & Peñaranda (1995), do Rosário (1996), Rutgers & Norris (1970), Short (1975), Sick (1985, 1993), Stotz *et al.* (1996), Wetmore (1926), Willis (1992).

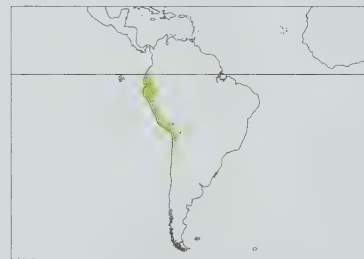
121. Croaking Ground-dove

Columbina cruziana

French: Colombe à bec jaune **German:** Perutäubchen **Spanish:** Columba Quiaguaga
Other common names: Gold-billed/Peruvian/Gold-ringed Ground-dove

Taxonomy. *Columba Cruziana* Prévost, 1842, Chile. Formerly placed in genus *Columbigallina*. Shows similarities in colour and plumage patterns with *C. picui*, to which probably closely related. Monotypic.

Distribution. Arid and semi-arid Pacific coast from N Ecuador to N Chile, and E in N Peru to Marañón Valley.



Descriptive notes. 15 cm; male 52 g, female 46 g. Head bluish grey becoming brownish grey on upperparts and darker on central tail feathers; wing-coverts pinkish grey with blue black spots; some innerwing coverts with purplish tips forming bar across upperwing; breast and underparts mauve pink; outer tail feathers black with narrow white tips; iris red with white outer ring, yellow orbital skin; bill longer than in other congeners, vivid yellow or golden-yellow near base, black near tip; feet pink. Female brown rather than bluish; wing markings as in male but less intense. Juvenile similar to female but with buffish tips to feathers.

Habitat. Arid and semi-arid regions, subtropical scrub and riparian thickets; frequents farmland, gardens and parks. A ground-dwelling species. Sometimes ascends to 2400 m in Loja, SW Ecuador and Arequipa, Peru.

Food and Feeding. Seeds taken from the ground. No further information available.

Breeding. Nests found in all months except Sept-Oct in SW Ecuador, but season may be less prolonged away from human habitation; breeding commences 4-6 weeks after the first good rains. Nests in bushes or trees, sometimes on ground or on ledges of buildings, banks or low cliffs. Clutch usually 2 white eggs (1-3); incubation 14 days; fledging 10-11 days. Two aviary-hatched nestlings on a nest placed on a windowsill left the nest at day 10 but remained on the ledge c. 30 cm from the nest; they did not fly into the outer aviary until day 13.

Movements. Resident. Accidental record at 2900 m.

Status and Conservation. Not globally threatened. Considered common through most of its range. May even have profited from human activities since birds near human habitation appear to have longer breeding season; also, species regularly found in habitats heavily altered by man.

Bibliography. Araya & Chester (1993), Best & Clarke (1991), Best *et al.* (1996), Bloch *et al.* (1991), Butler (1979), Dunning (1982), Fjeldså & Krabbe (1990), Hellmayr & Conover (1942), Johnson (1967), Koepcke (1970), Marchant (1958, 1959), Meyer de Schauensee (1982), Parker *et al.* (1982), Rutgers & Norris (1970), Stotz *et al.* (1996), Trollope (1974), Williams & Tobias (1994).

122. Blue-eyed Ground-dove

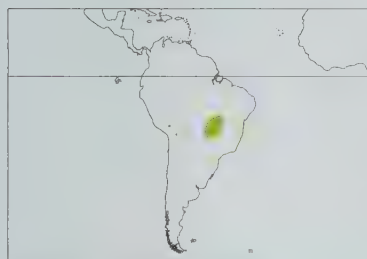
Columbina cyanopsis

French: Colombe aux yeux bleus **German:** Blauaugentäubchen **Spanish:** Columba Ojiazul

Taxonomy. *Peristera cyanopsis* Pelzel, 1870, Cuyabá, Mato Grosso, Brazil. Formerly placed in monotypic genus, *Oxypelia*; resembles *Claravis* in having attenuated first primary. Monotypic.

Distribution. Few localities in SC Brazil, in Cuiabá, S Mato Grosso, S Goiás to Itapura, and extreme W São Paulo. Recently found in Mato Grosso; listed for Minas Gerais, but apparently in error.

Descriptive notes. 15.5 cm. Head, neck, wing-coverts, uppertail-coverts and breast purplish rufous, lighter brown on lower breast, belly, flanks, mantle, back and scapulars; vent and undertail-



coverts white; iridescent blue spots on wings; throat whitish; outer primaries dark brown with chestnut inner webs, inner primaries chestnut with dark tips; underwing and central tail feathers rufous; iris blue, orbital skin grey; bill black, with grey base; legs and feet pink. Female paler, especially on underparts. Juvenile with rufous edges to many feathers; wing markings obscure.

Habitat. Open savanna and *campo* grasslands within *cerrado*; recorded up to 800 m. A ground-dwelling species; found singly or in pairs.

Food and Feeding. No information available; presumably feeds on seeds like congeners.

Breeding. No information available.

Movements. No information available.

Status and Conservation. **CRITICALLY ENDANGERED.** Prior to 1941 known only from a few localities in SC Brazil; rediscovered in Serra das Araras Ecological Station, Mato Grosso, in Feb 1986, but no subsequent records. Listed for Minas Gerais, but apparently in error. Extremely rare and poorly known; range is probably contracting due to agricultural activities, but reasons for its apparently exceptional scarcity must remain open to speculation. Possibly close to extinction, even though now protected under Brazilian law.

Bibliography. Cavalcanti (1988), Collar & Andrew (1988), Collar, Crosby & Stattersfield (1994), Collar, Gonzaga *et al.* (1992), Dubs (1992), Dunning (1982), Forrester (1993), Hellmayr & Conover (1942), Meyer de Schauensee (1982), Pinto (1937, 1945a, 1949, 1964), Ruschi (1979), Sick (1965, 1985, 1993), Stotz *et al.* (1996), Wege & Long (1995), Willis (1992), Willis & Oniki (1993).

Genus *CLARAVIS* Oberholser, 1899

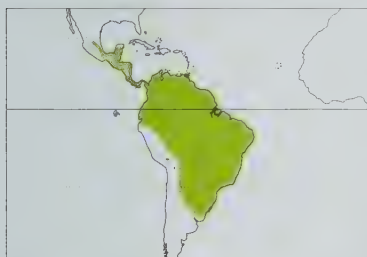
123. Blue Ground-dove

Claravis pretiosa

French: Colombe bleutée **German:** Schmucktäubchen **Spanish:** Tortolita Azulada
Other common names: Ashy/Cinereous Dove

Taxonomy. *Peristera pretiosa* Ferrari-Pérez, 1886, Brazil. Monotypic.

Distribution. E Mexico (from E San Luis Potosí) through Central America to Panama, then S from Colombia, Venezuela, Trinidad and the Guianas, W of Andes to NW Peru, and E of Andes to Bolivia, N Argentina, Paraguay and S Brazil.



Descriptive notes. Male 18-23 cm, 52-72 g; female 18.5-21.5 cm, 65-77 g. Bluish grey throughout, underparts paler, forehead and throat white; black spots edged with grey in rows on wing-coverts and secondaries; primaries black, first primary attenuated; two central tail feathers dark bluish grey, lateral ones black; iris orange, red, pink or yellowish, orbital skin pale greyish olive green, yellowish terminally; bill greyish green; legs and feet pink. Female olive brown to cinnamon-brown above, forehead paler; primaries black, wing spots chestnut, larger spots with buff margins; forehead and upper breast tawny-olive, chin white, upper

throat pale grey; buffy brown below. Juvenile similar to female but wing spots smaller and indistinct; scapulars and wing-coverts have pale buff edges; feathers of foreneck and breast have pale margins.

Habitat. Humid to semi-humid forests, free of undergrowth; forest borders, clearings. Occurs from sea-level up to 1620 m in Panama; to 1200 m in Costa Rica; occasionally to 1800 m in Colombia and has been recorded to 2100 m in south of range. On Trinidad, inhabits forest edges, notably those bordering savanna. Perches and roosts in trees; male may call from high treetop, although more usually sings from mid-storey, semi-concealed perches.

Food and Feeding. Poorly known. Feeds on ground on seeds and small insects; usually singly or in pairs, and flocks numbering up to 40 individuals infrequent.

Breeding. Main breeding period in Panama is Mar-Aug; nests Feb-Oct in Costa Rica and Colombia. Nest is a frail saucer composed of fine twigs, rootlets or tendrils placed 1-11 m up in thickets, vine tangles or trees. Nests in Trinidad made of fine twigs, lined with fine grass. Clutch 2 white eggs, occasionally 1 in Panama; incubation 14-15 days; fledging 13-14 days.

Movements. Seasonal movements observed, notably in drier parts of range, e.g. species common in Yucatán (SE Mexico) in Jun-Aug, but absent Mar-May; in Veracruz locally absent Sept-Jan, appearing again in Feb-Apr.

Status and Conservation. Not globally threatened. Generally fairly common throughout most of its sizeable range; fairly common to common in Mexico; in Costa Rica, commonest on Caribbean and S Pacific slopes; widespread but local in Colombia, where commonest in arid and scrubby parts of N and E; rare in Trinidad.

Bibliography. Binford (1989), Canevari *et al.* (1991), Chebez (1992), Dickey & van Rossem (1938), Gifford (1941), Haverschmidt & Mees (1994), Hellmayr & Conover (1942), Herklots (1961), Hilty & Brown (1986), Howell & Webb (1995a), Land (1970), Meyer de Schauensee & Phelps (1978), Monroe (1968), Navas & Bó (1988), de la Peña (1988), Ridgely & Gwynne (1989), do Rosário (1996), Rutgers & Norris (1970), Schubart *et al.* (1965), Short (1975), Sick (1985, 1993), Skutch (1959a, 1964, 1981), Slud (1964), Snyder (1966), Stiles & Skutch (1989), Stotz *et al.* (1996), Thurber *et al.* (1987), Tostain *et al.* (1992), Wetmore (1957, 1968).

124. Purple-winged Ground-dove

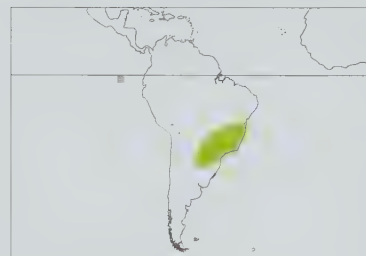
Claravis godefrida

French: Colombe de Geoffroy **German:** Purpurbindentäubchen **Spanish:** Tortolita Alipúrpura
Other common names: Purple-barred Ground-dove, Geoffroy's Dove

Taxonomy. *Columba Godefrida* Temminck, 1811, Brazil.

Forms superspecies with *C. mondetoura*. Monotypic.

Distribution. SE Brazil (S Bahia to S Santa Catarina), E Paraguay and NE Argentina (Misiones). Range poorly known.



Descriptive notes. 19-23 cm. Male darkish blue-grey above, paler below; two broad bands of deep purple across folded wing; smaller band of bluish purple across lesser coverts; central tail feathers grey, four outermost ones white and the rest greyish white. Female brown overall with wing bands slightly paler than the male's; central tail feathers brown, outer ones black with broad buff tips; bill blackish, legs dark yellowish brown. Juvenile female paler than adult, feathers with dusky subterminal areas and buff fringes; juvenile male darker than juvenile female.

Habitat. Woodland, notably bamboo stands in dense forest or forest borders; appears during bamboo blooms. Thought to prefer hillier terrain, and occurs up to at least 1400 m in SE Brazil.

Food and Feeding. Bamboo seeds important, when available; ledge and grass seeds taken on the ground; also feeds on papaya and other fruit.

Breeding. Few data. Breeds in Nov and Dec in Teresópolis (N of Rio de Janeiro) in response to bamboo blooms; very vocal in S Santa Catarina in Feb. In Argentina, apparently nests in trees, laying 2 white eggs. No further information available.

Movements. Outside breeding season, small flocks congregate near fruiting bamboo (*Guadua angustifolia*, *Chusquea ramosissima*).

Status and Conservation. **CRITICALLY ENDANGERED.** Protected under Brazilian law since 1973. Once common on coast of SE Brazil where flocks of 50-100 birds were sometimes seen, and formerly frequent in captivity, e.g. common in Rio de Janeiro market in late 19th century, and several 100's were apparently imported into France and other parts of Europe in c. late 1930's. Now in serious decline, principally due to deforestation; despite suggestion by some authors that the species remains locally common, there are just a handful of records since 1980's, with only two of these involving multiple occurrences (both in Feb 1997); in this period, it has been recorded from just one site in Argentina, one in Paraguay and seven in Brazil. In Paraguay, seems to be very rare with only a single record from 20th century; few records from Argentina. Research and survey work urgently needed in order to establish basic details of biology and ecology, as well as conservation requirements; precise limits of range remain to be determined.

Bibliography. Berton (1901), Canevari *et al.* (1991), Chebez (1986b), Collar & Andrew (1988), Collar, Crosby & Stattersfield (1994), Collar, Gonzaga *et al.* (1992), Hayes (1995), Hellmayr & Conover (1942), King (1978/79), Kirwan *et al.* (1997), Lowen, Bartrina *et al.* (1996), Lowen, Clay *et al.* (1995), Olrog (1979), de la Peña (1988), do Rosário (1996), Saibene *et al.* (1996), Seott & Brooke (1985), Sick (1985, 1993), Stotz *et al.* (1996), Wege & Long (1995), Willis & Oniki (1993).

125. Maroon-chested Ground-dove

Claravis mondetoura

French: Colombe mondetour **German:** Mondetourtäubchen **Spanish:** Tortolita Pechimorada
Other common names: Purple-breasted Ground-dove, Mondetour's Dove

Taxonomy. *Peristera mondetoura* Bonaparte, 1856, Caracas, Venezuela. Forms superspecies with *C. godefrida*. Some races described from very small samples, and supposed differences may be due to individual, not subspecific, variation: birds of N & C Peru may be more properly ascribed to nominate race, but in any case race *inca* appears doubtfully valid. Six subspecies recognized.

Subspecies and Distribution.

C. m. ochoterena van Rossem, 1934 - SE Mexico, from mountains of Veracruz to S Chiapas.

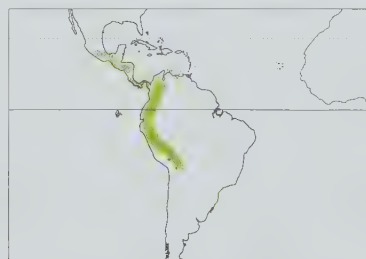
C. m. salvini Griscom, 1930 - Guatemala, El Salvador and Honduras.

C. m. umbrina Griscom, 1930 - Costa Rica.

C. m. pulchra Griscom, 1930 - W Panama.

C. m. mondetoura (Bonaparte, 1856) - N & W Venezuela, Colombia on both slopes of Andes, and E Ecuador.

C. m. inca van Rossem, 1934 - Peru and WC Bolivia (La Paz, Cochabamba).



Descriptive notes. Male 18-24 cm, female 19-22 cm; 89-95 g. Male similar to *C. godefrida*, but darker; forehead, face and chin greyish white; breast dark purple (in contrast to *C. godefrida*), grading to grey on belly and vent; iris orange or orange-brown, surrounded by yellow orbital skin; bill black, with grey base; legs and feet red. Female slightly darker than female *C. godefrida*; cinnamon forehead and face. Juvenile more rufous than female, feather edges rusty, ill-defined dark brown spots on wings. Races rather similar, with only slight differences in coloration, possibly in part due to individual variation.

Habitat. Occupies heavy undergrowth in wet montane forest; strongly associated with bamboo, notably when this is blooming; also found in second-growth thickets and at forest edge. Occurs at 1200-2500 m in Mexico, 900-3000 m in Costa Rica, 1000-2100 m in Panama, and 1300-2600 m in Andes. Males call from low to middle storeys.

Food and Feeding. Takes seeds and fallen fruits; seen taking *Phytolacca* in Costa Rica; bamboo seeds relished. Feeds on ground under dense vegetation; usually alone or in pairs, but may form flocks of as many as 10-15 birds.

Breeding. No information available.

Movements. Nomadic but poorly known, appearing when bamboo trees seed, disappearing when supply of seeds exhausted.

Status and Conservation. Not globally threatened. Little known, but considered uncommon to rare, local and rather unpredictable in its appearances; shy and difficult to observe. Few recent records from Colombia; has apparently always been rare in Panama; considered to be common in Sierra de las Minas (Guatemala) in Aug-Dec 1958 and at El Sumidero, Chiapas (SE Mexico) in Jul 1988. Probably in danger of decline if heavy deforestation continues throughout its range. Research and survey work required. Sometimes also listed as occurring in Nicaragua, but presence there appears to be hypothetical.

Bibliography. Fjelds & Krabbe (1990), Hellebuyck (1983), Hellmayr & Conover (1942), Hilty (1985), Hilty & Brown (1986), Howell & Webb (1995a), Land (1970), Meyer de Schauensee & Phelps (1978), Monroe (1968), Ridgely & Gwynne (1989), Slud (1964), Stiles & Skutch (1989), Stotz *et al.* (1996), Thurber *et al.* (1987), Wetmore (1968).



Genus *METRIOPELIA* Bonaparte, 1855

126. Bare-faced Ground-dove

Metriopelia ceciliae

French: Colombe de Cécile **German:** Nacktgesichttäubchen **Spanish:** Palomita Cascabelita
Other common names: Bare-eyed Ground-dove, Cecilia's/Spectacled/Yellow-eyed Dove

Taxonomy. *Columba* (*Chamaepelia*) *Ceciliae* [sic] Lesson, 1845, Peru.

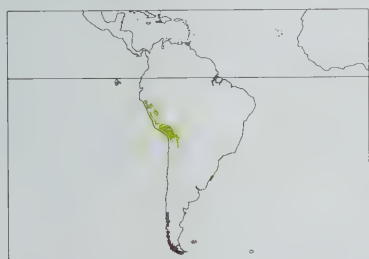
Related to *M. morenoi*. Race *obsoleta* doubtfully valid. Race *zimmeri* commonly listed as *gymnops*, but this name is preoccupied. Species known to dust-bathe, rare in pigeons. Three subspecies recognized.

Subspecies and Distribution.

M. c. ceciliae (Lesson, 1845) - W Peru.

M. c. obsoleta (Zimmer, 1924) - E Peruvian Andes in upper Marañón Valley and its tributaries in N Peru (S to La Raya).

M. c. zimmeri J. L. Peters, 1937 - extreme S Peru through Bolivia to N Chile (Tarapacá) and NW Argentina (Salta, Jujuy).



Descriptive notes. 16-17 cm; c. 66 g. Drab brown or greyish brown above, feathers tipped white or buffish; light tips on wing-coverts and secondaries larger than on other feathers, giving spotted effect; neck and breast grey with vinous pink tinge; belly and undertail-coverts buffish; primary coverts, primaries, outer secondaries and underwing-coverts black, rufous on inner webs and under sides of primaries; central tail feathers drab, outer ones black with white tips; iris blue or bluish white; well developed orbital skin yellow, golden or orange, bordered by narrow black feathers; feet and legs pink. Sexes alike, but female usually has less pronounced pink tinge on breast. Juvenile similar to adult, but bare parts duller, and plumage with looser texture. Race *obsoleta* paler and greyer; *zimmeri* browner and somewhat darker, iris yellow to blue.

Habitat. *Puna* and arid temperate zones; Andean slopes and Altiplano usually at 2000-4500 m, but lower in W Peru; at 2500-3500 m in NW Argentina. Arid and semi-arid regions characterized by sandy ground with scattered rocks and stones and sparse vegetation; found in cactus land and on bushy or lightly wooded slopes, but appears to avoid *Puya* stands where *M. melanoptera* occurs. Associated with human habitations in higher parts of range, usually where arboreal vegetation is totally absent, but also abundant in major towns and cities e.g. Lima. Roosts on sheltered rock ledges or in holes in houses.

Food and Feeding. Virtually nothing recorded. Feeds on the ground, usually in small parties.

Breeding. Eggs have been found in Mar in Chile, and in winter in Lima, Peru. Nest placed on the ground or in cliffs, or in holes in buildings.

Movements. May descend to 600 m in some valleys, and occasionally to sea-level in S Peru.

Status and Conservation. Not globally threatened. Considered to be common throughout most of its range; local but fairly common in N Chile and uncommon in NW Argentina. Has not obviously suffered adverse effects from man, and often associated with human habitation, sometimes even nesting in buildings.

Bibliography. Abadie (1991), Araya & Chester (1993), Canevari *et al.* (1991), Dorst (1957c), Fjeldsá & Krabbe (1990), Gifford (1941), Hellmayr & Conover (1942), Howell (1996), Johnson (1967), Krabbe *et al.* (1996), Nicolai (1962), de la Peña (1988), Rocha & Peñaranda (1995), Roe & Rees (1979), Rösler (1996), Stotz *et al.* (1996), Tubaro & Mahler (1998), Zimmer (1930).

127. Moreno's Ground-dove

Metriopelia morenoi

French: Colombe de Moreno **German:** Morenotäubchen **Spanish:** Palomita de Moreno
Other common names: Bare-eyed/Moreno's Bare-faced Ground-dove

Taxonomy. *Gymnopolia morenoi* Sharpe, 1902, Incahuasi, Salta, Argentina.

Related to *M. ceciliae*. Monotypic.

Distribution. NW Argentina, in Salta and Tucumán (above 2000 m), Jujuy, Catamarca and La Rioja.



Descriptive notes. 17 cm. Upperparts dull brown, greyish on head and mantle and rufous on uppertail-coverts; throat whitish grey; rest of underparts pale brownish grey becoming buffish on ventral area; undertail-coverts reddish brown; primaries, outer secondaries and underwing black, outer webs of primaries 2-5 strongly emarginated; outer tail feathers black with white tips; iris brown (white in one case); well developed bright orange orbital skin, bordered by thin black line; legs and feet pink. Sexes similar, but orbital skin of female less brilliant. Juvenile similar to adult, but feathers of crown and upperparts have rufous fringes, and inner webs of prima-

ries have fringed rufous.

Habitat. Temperate and *puna* zones from 1800 to at least 3200 m; pre-*puna* vegetation characterized by columnar cacti, scrub and scattered trees on sandy and rocky hills. Not found in *Puya* stands where *M. melanoptera* occurs.

Food and Feeding. No information on diet. Feeds in groups on ground.

Breeding. Reported nesting in clay walls, and probably nests in cavities like *M. ceciliae*. Lays 2 white eggs. No further information available.

Movements. No information.

Status and Conservation. Not globally threatened. Very poorly known and little studied. Has rather restricted range, in which it is locally not uncommon to rare, according to different observers. Virtually nothing known of biology or ecology; extensive research required.

Bibliography. Canevari *et al.* (1991), Dinelli (1929), Dunning (1982), Fjeldsá & Krabbe (1990), Haene (1996), Hellmayr & Conover (1942), Johnson (1967), Meyer de Schauensee (1982), Olrog (1984), de la Peña (1988), Stotz *et al.* (1996).

128. Black-winged Ground-dove

Metriopelia melanoptera

French: Colombe à ailes noires **German:** Weißbugtäubchen **Spanish:** Palomita Alinegra

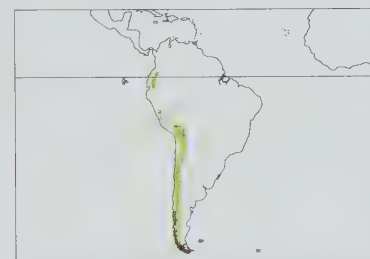
Taxonomy. *Columba Melanoptera* Molina, 1782, Chile.

Related to *M. aymara*. Two subspecies recognized.

Subspecies and Distribution.

M. m. saturator Chubb, 1917 - Andes of SW Colombia (from Pasto, in Nariño) and Ecuador.

M. m. melanoptera (Molina, 1782) - Peru (from at least upper Marañón Valley) and Bolivia to Chile (S to Colchagua) and W Argentina (S to Santa Cruz and W Chubut); also NE Isla Grande in Tierra del Fuego.



Descriptive notes. 21-23 cm; 113-125 g. Greyish brown or earth brown above suffused with faint pink tinge, outer wing-coverts paler and greyer; throat whitish; shoulder and edge of wing white; primaries, primary coverts, outer secondaries and much of underwing black; indentations on inner webs of primaries 8-10; central tail feathers greyish brown, outer ones black; underparts fawn pink, lighter on belly and merging to grey on flanks; underside of tail and undertail-coverts black; iris blue, violet, yellowish or bright green with narrow reddish outer ring; orbital skin salmon pink, orange or yellow; legs and feet dark brown to black; bill black. Female

has underparts less pink. Juvenile has narrow buff edges to most coverts and lacks adult's pink tinge. Race *saturator* slightly darker above, with less pink below.

Habitat. Occupies *paramo* zone of Colombia and Ecuador, and *puna* zone of Peru, Bolivia and Chile. Most often found near tree-line in arid and semi-arid regions; frequents grassy plains, scrubby grassland away from trees, but also bushy slopes and *Polylepis* woodland; sometimes found with columnar cacti or in stands of caulescent bromeliads (*Puya*); in Jujuy (NW Argentina), sometimes seen on trees in village squares. Occurs at 2000-4400 m throughout most of Andes; locally to 1000 m and accidentally to near sea-level in Peru; 900-4900 m in Chile, though lower in far south; usually above 3000 m in W Argentina. On Peruvian Altiplano (3500-4000 m), the species takes refuge in centre of *Puya* stands, and as many as 30 individuals have been found roosting in one plant.

Food and Feeding. No information on diet. Feeds on the ground, usually in small tight flocks but at times in larger groups; on Altiplano in Peru, feeds in grass cover between *Puya* bromeliads.

Breeding. In N of range eggs found Aug-Oct, but in S season extends to Nov-Feb; in Peru breeds Mar-May. Nest placed in thick bushes, *Puya* bromeliads or cacti; six nests found c. 2 m up in grove of *Polylepis* trees; occasionally on the ground or on buildings. Lays 2 white eggs.

Movements. Moves to lower elevations in winter. Chilean populations, except apparently in extreme N, descend from mountains to foothills and plains and even to the coast. Makes daily flights from roosting sites on bushy slopes or in *Polylepis* woodland to grassy plains to feed.

Status and Conservation. Not globally threatened. Few precise data available from any part of extensive range. Appears to be generally common and locally numerous; local in SW Colombia. Occupies rather bleak habitat, where not known to suffer serious persecution from humans; nevertheless, favoured habitat of *Polylepis* woodland is under threat in many areas due to excessive cutting for firewood.

Bibliography. Araya & Chester (1993), Babarskas & Gil (1996), Canevari *et al.* (1991), Dorst (1957c), Fjeldsá & Krabbe (1990), Hellmayr (1932), Hellmayr & Conover (1942), Hilty & Brown (1986), Howell (1996), Howell & Webb (1995b), Humphrey *et al.* (1970), Johnson (1967), Krabbe *et al.* (1996), de la Peña (1988), Roe & Rees (1979), Stotz *et al.* (1996), Tubaro & Mahler (1998), Wetmore (1926).

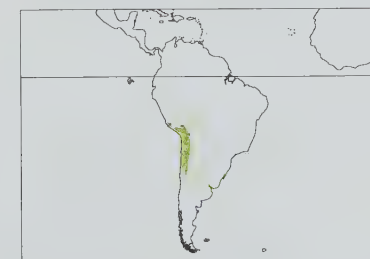
129. Golden-spotted Ground-dove

Metriopelia aymara

French: Colombe aymara **German:** Aymarätäubchen **Spanish:** Palomita Aimará
Other common names: Bronze-winged Ground-dove

Taxonomy. *Columba Aymara* Prévost, 1840, Chile. Related to *M. melanoptera*. Monotypic.

Distribution. SC & S Peru (from W Ayacucho) and C & S Bolivia to N Chile (S to Coquimbo) and NW Argentina (S to Andes of Mendoza).



Descriptive notes. 17-19 cm. Pale fawn brown above with vinous pink tinge; vinous pink below becoming white on throat and buff on belly; central tail feathers greyish brown with black tips, outer tail feathers purplish black; fawn uppertail-coverts long, extending almost to end of closed tail; undertail-coverts and primaries black, latter with chestnut bases; row of iridescent golden bronze spots on lesser coverts; two purplish black patches on scapulars and innermost secondaries; iris brown; bill black; legs and feet pink. Sexes alike. Juvenile paler than adult with pale fringes on wing-coverts and little or no pink tinge; lacks bronze wing spots.

Habitat. Inhabits *puna* zone of Andes; on plains, wide lake shores, and dried-up clay-pans in semi-desert with scattered *Lepidophyllum* bushes, grass tussocks, cushion plants or low annuals. During nesting season, congregates in *Polylepis* woodland or rocky terrain, at times at very high elevations. Sometimes seen near villages. Usually at 2800-5000 m but in S part of range may be found as low as 300 m; in Andes of Tucumán typically over 4500 m.

On following pages: 130. Inca Dove (*Scardafella inca*); 131. Scaled Dove (*Scardafella squammata*); 132. Long-tailed Ground-dove (*Uropelia campestris*); 133. White-tipped Dove (*Leptotila verreauxi*); 134. White-faced Dove (*Leptotila megalura*); 135. Grey-fronted Dove (*Leptotila rufaxilla*); 136. Grey-headed Dove (*Leptotila plumbeiceps*); 137. Pallid Dove (*Leptotila pallida*); 138. Brown-backed Dove (*Leptotila battyi*); 139. Grenada Dove (*Leptotila wellsii*); 140. Caribbean Dove (*Leptotila jamaicensis*); 141. Grey-chested Dove (*Leptotila cassini*); 142. Ochre-bellied Dove (*Leptotila ochraceiventris*); 143. Tolima Dove (*Leptotila conoveri*).

Food and Feeding. No information available on diet. Feeds on the ground, usually in small groups but sometimes in large flocks.

Breeding. Eggs have been found Apr-Aug in Bolivia and N Chile, and May-Jun in C Peru; juveniles recorded in Bolivia Jul-Sept and Dec. Nest placed in grass and possibly sometimes in trees or among rocks. Lays 2 white eggs.

Movements. Seasonal movements poorly understood and warrant further study.

Status and Conservation. Not globally threatened. Little precise information available, but species appears to be locally common in some areas e.g. in parts of Argentina; abundance seems to vary seasonally at least in parts of range. Research required in order to establish basic details of biology and ecology.

Bibliography. Araya & Chester (1993), Canevari *et al.* (1991), Fjeldså & Krabbe (1990), Hellmayr (1932), Hellmayr & Conover (1942), Johnson (1967), de la Peña (1988), Rocha & Peñaranda (1995), Roe & Rees (1979), Stotz *et al.* (1996).

Genus *SCARDAFELLA* Bonaparte, 1855

130. Inca Dove

Scardafella inca

French: Colombe inca

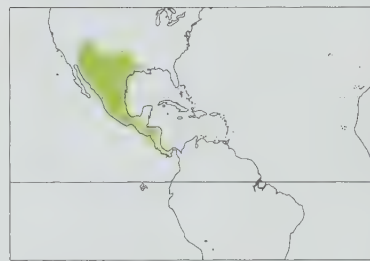
German: Aztekentäubchen

Spanish: Tortolita Mexicana

Taxonomy. *Chamaepelia inca* Lesson, 1847, Mexico.

Genus sometimes merged into *Columbina*. Forms a superspecies with *S. squammata*. Monotypic.

Distribution. SW & SC USA (S California, S Nevada, Arizona, S New Mexico, C Texas, SW Louisiana) through much of Mexico and Central America to NW Costa Rica.



Descriptive notes. Male 19-22 cm, female 19-22 cm; 30-58 g. Forehead pinkish grey becoming brownish pink on crown, face and neck; upperparts greyish brown, lighter on wings; throat whitish, breast pinkish grading to buffish white on belly and white on undertail-coverts; dusky grey fringes to all feathers except on breast and forehead, giving scaly effect; primaries chestnut with black outer webs on outer four pairs; central tail feathers greyish brown, next two pairs black with white tips, next two pairs white with black near base; iris variable, grading from orange to red; bill black; legs and feet pink. Female similar but pink less intense. Juvenile reminiscent of female but buff bars near edges of back and wing feathers; young bird has pale yellow iris.

Habitat. Prefers dry areas, brushy woodland, semi-open to open areas up to 2400 m, to 3000 m in Mexico; rarely found along streams and rivers. Often flocks with other dove species (e.g. *Columbina talpacoti*, *C. passerina*, *Zenaida asiatica* and *Leptotila verreauxi*); in order to conserve heat at night, sometimes forms pyramids of 5-12 birds in 2-3 rows roosting on each other's backs; during cold periods, may be hypothermic, body temperature dropping 5-12°C below normal.

Food and Feeding. Little information available on diet; takes cultivated grain where available, e.g. maize and corn. Feeds on the ground, where takes seeds and grit; only rarely feeds in flocks. Laboratory experiments indicate that species may acquire enough water to survive from fruits alone (e.g. *Opuntia*, tomatoes).

Breeding. Late Feb to Oct in USA; Apr-Aug, possibly to Oct, in Costa Rica; throughout the year in El Salvador. Small, compact nest of twigs, rootlets, weed stalks, grass, leaves, sometimes horsehair or bark strips, with shallow central depression, placed in bush or tree, usually 1-8 m above ground; nest building by both sexes; sometimes uses old nests of other birds. Clutch 2 glossy white eggs; incubation 13-15 days, by both sexes; young fed by both parents, brooded for 7-9 days; fledging 12-16 days. May start building or repairing nest within 1-2 days of young fledging; will raise several broods in USA, often 2-3 and occasionally 4-5.

Movements. Essentially sedentary, but winter vagrants have been recorded outside normal range in USA, in Oklahoma, Arkansas, Nebraska.

Status and Conservation. Not globally threatened. No precise details available on population sizes, but species is generally common throughout most of its sizeable range; common to fairly common throughout most of Mexico, though uncommon and local on plateau of NC. Associates closely with humans in some areas.

Bibliography. Anderson & Anderson (1948), Bartnicki (1979), Binford (1989), Chaisson *et al.* (1968), Dickey & van Rossem (1938), Engleman (1980), Felis (1976), Harrison (1978), Hellmayr & Conover (1942), Howell & Webb (1995a), Johnston (1960, 1961), Land (1970), Lasiewski & Seymour (1972), MacMillen & Trost (1966, 1967a, 1967b), Monroe (1968), Mueller (1992), Oberholser (1974), Price *et al.* (1995), Quay (1982), Ridgway (1916), Robertson & Schnapf (1987), Root (1988), Rowley (1984), Rutgers & Norris (1970), Skutch (1964), Slud (1964), Small (1994), Stiles & Skutch (1989), Stotz *et al.* (1996), Tweit *et al.* (1983).

131. Scaled Dove

Scardafella squammata

French: Colombe écaillée

German: Schuppentäubchen

Spanish: Tortolita Escamosa

Other common names: Scaly/Mottled/Ridgway's Dove, South American Zebra Dove

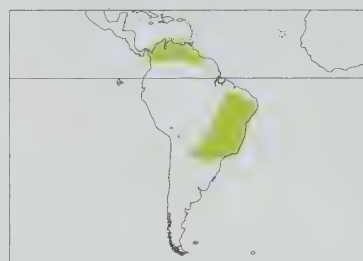
Taxonomy. *Columba squammata* Lesson, 1831, Bahia, Brazil. Genus sometimes merged into *Columbina*. Forms a superspecies with *S. inca*. Two subspecies recognized.

Subspecies and Distribution.

S. s. ridgwayi Richmond, 1896 - coastal Colombia (S to Vichada) through Venezuela (S to Orinoco Valley, including Margarita I) to French Guiana.

S. s. squammata (Lesson, 1831) - C & E Brazil (Pará S to Mato Grosso and Rio Grande do Sul) to Paraguay and NE Argentina (Misiones); also regular in Bolivia, where status uncertain.

Descriptive notes. 18-22 cm; 48-60 g. Similar to *S. inca* but less pink; outer webs of distal wing-coverts white, forming a conspicuous patch on closed wing; forehead, face and breast pale greyish pink merging to white on throat, belly and undertail-coverts; outer webs of distal primaries black at base (chestnut-based in *S. inca*); central tail feathers more grey than brown, outer ones black and white; iris varies from dark reddish brown to dark red; bill black; legs and feet pink. Sexes alike. Juvenile has buff-edged feathers on same tracts as *S. inca*. Race *ridgwayi* has black feather-edges broader.



Habitat. Arid tropical savanna with open ground, scattered trees and scrub cover; also second growth and riparian thickets; visits cultivated areas and human habitation including cities, e.g. Puerto Iguazú, Rio de Janeiro. Occurs in lowlands, up to 1200 m.

Food and Feeding. Few data available; known to take seeds and snails. Typically found singly or in pairs but not infrequent in small flocks of up to 12 birds.

Breeding. Nest building in Mar and Aug in Colombia; nests in Jan-Jun and Sept-Oct in NE Venezuela. Usually nests in small trees, 1-2 m up, occasionally on the ground; nest is a twiggy

cup, often more substantial than in most other doves. Lays 2 white eggs; at one nest studied, nesting period was of 29 days from nest building to fledging of young.

Movements. Generally sedentary. Vagrant to Trinidad. Status unclear in Bolivia, where species may be merely vagrant, but might breed.

Status and Conservation. Not globally threatened. Very few data available, but species considered common throughout much of its sizeable range. Research required on all aspects of biology and ecology; status in Bolivia requires clarification.

Bibliography. Andrela & Donatelli (1995), Canevari *et al.* (1991), French (1991), Friedmann (1948b), Friedmann & Smith (1950), Harrison (1961), Hellmayr & Conover (1942), Hilty & Brown (1986), Meyer de Schauensee & Phelps (1978), de la Peña (1988), do Rosário (1996), Rutgers & Norris (1970), Saibene *et al.* (1996), Schubart *et al.* (1965), Short (1975), Sick (1985, 1993), Stotz *et al.* (1996), Tostain *et al.* (1992), Wetmore (1939).

Genus *UROPELIA* Bonaparte, 1855

132. Long-tailed Ground-dove

Uropelia campestris

French: Colombe à longue queue

German: Campostäubchen

Spanish: Columbina Colilarga

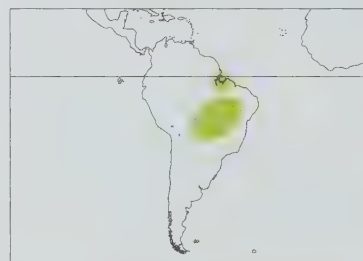
Other common names: Azure-spotted Ground-dove, Mauve-spotted Dove

Taxonomy. *Columbina campestris* Spix, 1825, Brazil. Taxonomic affinities uncertain; wing markings recall *Claravis*, but, except for its long tail, it otherwise resembles *Columbina* in size and coloration, and sometimes placed in latter genus. Two subspecies recognized.

Subspecies and Distribution.

U. c. campestris (Spix, 1825) - Amapá and Marajó I, and Brazilian tableland from Maranhão and Piauí S to W Minas Gerais.

U. c. figginsii Oberholser, 1931 - WC Brazil (Mato Grosso) and adjacent N & E Bolivia (Beni, Santa Cruz).



Descriptive notes. 16-17 cm. Forehead and forecrown bluish grey; upperparts brown, pinkish on hindneck; two small iridescent purple-black bands bordered with white on median and greater coverts; row of large black spots or purplish black spots on outer webs of inner secondaries; throat, necksides and breast pinkish mauve becoming white on belly and undertail-coverts; central tail feathers brown, outer ones black with white tips; iris grey, bluish grey or blue; orbital skin, feet and legs yellow to orange; bill dusky. Female paler around eye. Juvenile has buff edges to coverts, and chestnut and buff bands and spots on wings, not purple-black and white.

Habitat. Seasonally wet grassland, savanna and *campos* near water sources up to 1100 m; generally found in drier areas, avoiding dense or humid cover, often in light woodland edges or scrubby parkland.

Food and Feeding. Takes seeds taken from the ground. In dry season, usually found in pairs or groups of 3-5 birds, feeding on roads or roadsides cleared of vegetation.

Breeding. No information available.

Movements. Virtually unknown, but species appears to be resident at least in some parts of range.

Status and Conservation. Not globally threatened. In Brazilian Pantanal, usually not uncommon, but less common than *Scardafella squammata* during dry season. In Pocóné region of Mato Grosso, described as common, occurring in all seasons. In savannas in NW Minas Gerais and NW Mato Grosso (Pontes-e-Lacerda), species is common, inhabiting areas of pristine habitat and occurring alongside *Columbina talpacoti* and *S. squammata*. However, habitat destruction and modification may represent significant threats to the species in much of its range. Generally considered to be rather local throughout its range, and rated as being of medium conservation and research priority.

Bibliography. Dubs (1992), Dunning (1982), Forrester (1993), Goodwin (1959a), Hellmayr & Conover (1942), Meyer de Schauensee (1982), Pinto (1949, 1964), Reiser (1924), Rensen & Traylor (1989), Rösler (1996), Sick (1985, 1993), Stotz *et al.* (1996), Willis (1992).

Genus *LEPTOTILA* Swainson, 1837

133. White-tipped Dove

Leptotila verreauxi

French: Colombe de Verreaux

German: Blauringtaube

Spanish: Paloma Montaraz Común

Other common names: Pale-fronted/White-fronted Dove, Solitary Pigeon

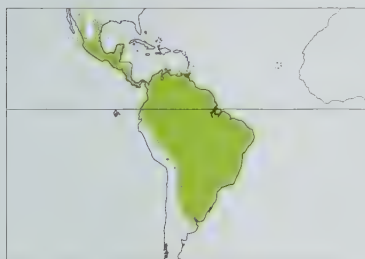
Taxonomy. *Leptotila* [sic] *verreauxi* Bonaparte, 1855, Colombia.

Probably forms superspecies with *L. megalura*. Race *brasiliensis* sometimes considered a separate species (incorporating *approximans*, *decipiens* and *chalcachenia*) on basis of supposed difference in

colour of orbital skin, but these differences are not consistently maintained. Race *riottei* doubtfully distinct from *verreauxi*; race *chalcachaenia* sometimes listed as *chlorauchaenia*, but former has priority by approximately one month. Fourteen subspecies recognized.

Subspecies and Distribution.

- L. v. capitalis* Nelson, 1898 - Tres Marias Is, off CW Mexico.
L. v. angelica Bangs & Penard, 1922 - Lower Rio Grande Valley in S Texas (USA), and Mexico from S Sonora and Chihuahua, S on both coasts to at least Guerrero and N Veracruz.
L. v. fulviventris Lawrence, 1882 - SE Mexico, including Yucatán Peninsula, S to NE Guatemala and Belize.
L. v. bangsi Dickey & van Rossem, 1926 - Pacific slope of Guatemala, El Salvador and Nicaragua, extending into W Honduras.
L. v. nuttingi Ridgway, 1915 - L Nicaragua, occurring on W shore and on Ometepe I.
L. v. riottei Lawrence, 1868 - Caribbean slope of Costa Rica.
L. v. verreauxi Bonaparte, 1855 - extreme SW Nicaragua through W Costa Rica and Panama to N Colombia (Magdalena Valley) and N Venezuela, with offshore islands of Aruba, Curaçao and Bonaire, and Margarita.
L. v. zapluta J. L. Peters, 1937 - Trinidad.
L. v. tobagensis Hellmayr & Seilern, 1915 - Tobago.
L. v. decolor Salvin, 1895 - W subtropical zone in Colombia S through W & C Ecuador to W & N Peru (Trujillo and Marañón Valley).
L. v. brasiliensis (Bonaparte, 1856) - the Guianas and N Brazil, S to N bank of lower Amazon, W to R Solimões.
L. v. approximans Cory, 1917 - NE Brazil from Piauí and Ceará to N Bahia.
L. v. decipiens (Salvadori, 1871) - E Peru and E Bolivia across C Brazil (S of Amazon through Mato Grosso to São Paulo).
L. v. chalcachaenia P. L. Sclater & Salvin, 1870 - extreme S Bolivia, Paraguay, S Brazil (Paraná) and Uruguay to NC Argentina (Tucumán, Córdoba, Buenos Aires).



Descriptive notes. Male 23.5-29.5 cm, female 24.5-29 cm; 96-157 g. Forehead white with pinkish or greyish pink flush, becoming iridescent purplish brown or grey on crown; nape and hindneck brownish with purplish or bronzy iridescence; upperparts olive-brown with greyish tinge; outer webs of outer secondaries with narrow pale tawny fringes; central tail feathers greyish brown, outer ones blackish with broad white tips; throat white; face, breast and sides of neck pale greyish pink becoming white on belly and undertail-coverts; underwing chestnut; iris from straw yellow, orange to orange-red; bare orbital skin dark reddish to cobalt or sky blue, to grey

or greenish blue; bill black; legs and feet red or purplish red. Female sometimes indistinguishable from male, but usually slightly duller, less vinaceous on forehead, neck and upper breast; hindneck usually bronzy and less often purplish. Juvenile much duller than adult; narrow pale brown fringes to scapulars and wing-coverts; breast light greyish brown with fine pale buffy brown fringes to feathers; no gloss on hindneck. Races differ mainly in coloration; reported differences in colour of orbital skin, blue in southernmost populations, reddish elsewhere, are not consistently maintained.

Habitat. Inhabits bush, forest edge and open woodland, and groves or thickets in cultivated areas in both temperate and tropical zones; typically in semi-arid or arid districts, and replaced by allied species in humid forest areas; tends to avoid forest interior and broad treeless areas. In Costa Rica, seeks conditions intermediate between humid rain forest and dry interior valleys, and thus avoids evergreen forest; ranges from lowlands to 800 m on Pacific slope, and along N Cordillera to 1500 m. In Panama, tends to colonize deforested areas and is common in lighter second-growth woodland, ranging to 1830 m in W Chiriquí. In Andes, occurs up to 2800 m, occasionally 3200 m. In valley of Rio Grande, Texas, prefers thickets of native brush with dominant species: Texas ebony (*Pithecellobium ebano*), anagua, brazil, prickly ash (*Zanthoxylum fagara*), spiny hackberry, sugar hackberry, cedar elm, coma (*Bumelia celastrina*), lotebush (*Zizyphus obtusifolia*), Texas persimmon (*Diospyros texana*) and mesquite (*Prosopis*); understorey of these thickets tends to be sparse, enabling the doves to walk about freely.

Food and Feeding. Takes small seeds and some insects, including caterpillars and moths. In Texas, has been recorded feeding on seeds of forbs, e.g. pigeon berry (*Rivina humilis*), grasses, and fruit from sugar hackberry, anagua (*Ehretia anacua*) spiny hackberry, brazil and citrus; also takes seeds of crops, e.g. *Sorghum*, corn and sunflower. Feeds on the ground.

Breeding. Nests found all year round in Costa Rica, but fewest in May-Jun and Oct-Nov; most months in Surinam. Nest is rather substantial bowl of sticks, vines, rootlets and straws usually 1-3 m above ground in a thicket or vine tangle; occasionally placed as low as 30 cm above ground or as high as 18 m. Clutch 2 creamy white eggs (1-3); incubation c. 14 days; at 10-12 days nestlings may make short flights from the nest, but fledging normally 13-14 days. In a study in Texas, 80% of pairs fledged at least 1 young.

Movements. Little information. Resident all year round in Texas. Wing shape reminiscent of a woodcock (*Scolopax*), enabling bird to fly around obstacles; attenuated first primary believed to enable it to change direction and speed quickly; generally more inclined to walk than to fly.

Status and Conservation. Not globally threatened. No precise details available, but species appears to be widespread and common throughout much of its extensive range; common to fairly common in Mexico, Honduras and W Nicaragua; common in Colombia, and throughout much of South America.

Bibliography. Belton (1984), Binford (1989), Boydston (1982), Boydston & DeYoung (1985, 1987, 1988), Burger (1992), Canevari *et al.* (1991), Chebez (1992), Contreras *et al.* (1990), ffrrench (1980), Fjeldsá & Krabbe (1990), Fraga (1983), Guix (1995), Haverschmidt & Mees (1994), Hellmayr & Conover (1942), Herklots (1961), Hilty & Brown (1986), Homerstad (1984), Howell & Webb (1995a), Ingels (1976, 1982), Klimaitis & Moschione (1987), Lack (1976), Land (1970), Lowery & Dalquest (1951), Meyer de Schauensee & Phelps (1978), Monroe (1968), de la Peña (1988, 1996), Price *et al.* (1995), Ridgely & Gwynne (1989), Romero & Morales (1981), Root (1988), do Rosário (1996), Rowley (1984), Schubart *et al.* (1965), Short (1975), Sick (1985, 1993), Skutch (1964, 1981), Slud (1964), Snyder (1966), Stiles & Skutch (1989), Stotz *et al.* (1996), Tostain *et al.* (1992), Vleck & Vleck (1979), Voous (1983), Waggener *et al.* (1994), Wetmore (1926, 1939, 1968), Zimmer (1930).

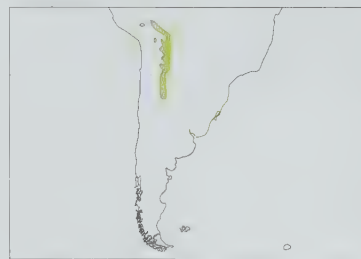
134. White-faced Dove

Leptotila megalura

French: Colombe à face blanche **German:** Yungastaube **Spanish:** Paloma Montaraz de las Yungas
Other common names: Large-tailed/Long-tailed Dove

Taxonomy. *Leptotila* [sic] *megalura* P. L. Sclater and Salvin, 1879, Tilotilo, Yungas, Bolivia. Probably forms superspecies with *L. verreauxi*, although the two overlap widely in NW Argentina. S populations sometimes awarded separate race, *saturata*, on basis of stronger ruddy tinge. Monotypic.

Distribution. Andes in N, E & SE Bolivia (La Paz, Cochabamba, Santa Cruz, Chuquisaca, Tarija) and NW Argentina (Jujuy, Salta, Catamarca, Tucumán, La Rioja).



Descriptive notes. 29-32 cm. Easily confused in the field with *L. verreauxi* due to similar colour pattern; however, present species generally darker and more ruddy brown above; feathers surrounding eye also white; hindneck and upper mantle suffused with purple gloss, never bronze as in some *L. verreauxi*; tail graduation less pronounced, slightly narrower white terminal bar; central tail feathers browner and less grey than in *L. verreauxi*; rufous of underwing less extensive, becoming drab grey at rear edge; attenuated tip of outer primary differs from *L. verreauxi* in being slightly expanded subapically. Sexes similar. Juvenile duller than adult with wing-

coverts slightly scaled in appearance.

Habitat. Subtropical and tropical humid regions, including alder woods, coppice and second growth; also semi-arid areas with *Prosopis* woodland, *Schinus* and *Molina*, at 900-2800 m. Sometimes frequents cultivated areas; usually seen singly or in small groups.

Food and Feeding. No information available.

Breeding. Little information. Nests in bushes or trees. Typical clutch is 2 cream-coloured eggs.

Movements. No information. Presumably sedentary.

Status and Conservation. Not globally threatened. Generally uncommon through much of its range, but common in Yungas, e.g. at Vila-Vila in Cochabamba and Calilegua in Jujuy. Very poorly known and observations hampered by possible confusion with *L. verreauxi*; extensive research required.

Bibliography. Babarskas *et al.* (1995), Canevari *et al.* (1991), Dunning (1982), Fjeldsá & Krabbe (1990), Hellmayr & Conover (1942), Krabbe *et al.* (1996), Meyer de Schauensee (1982), Olog (1984), de la Peña (1988), Remsen & T aylor (1989), Rösler (1996), Short (1975), Stotz *et al.* (1996).

135. Grey-fronted Dove

Leptotila rufaxilla

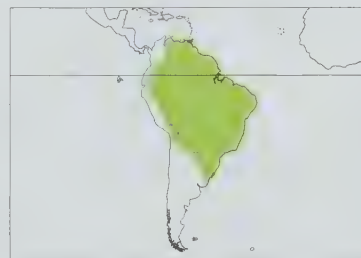
French: Colombe à front gris **German:** Rotachseltaube **Spanish:** Paloma Montaraz Frentiblanca

Taxonomy. *Columba Rufaxilla* Richard and Bernard, 1792, Cayenne.

May form superspecies with *L. pallida* and *L. plumbeiceps*, and possibly also with *L. batryi* and *L. wellsii*, and all five have been considered conspecific. Also related to *L. verreauxi*. Six subspecies recognized.

Subspecies and Distribution.

- L. r. pallidipectus* Chapman, 1915 - E Colombia (S to R Guaviare) and probably W Venezuela.
L. r. dubusi Bonaparte, 1855 - SE Colombia to CS Venezuela (base of Mt Duida) and S to E Ecuador and (probably this race) E Peru; limits of range in Brazil unknown.
L. r. rufaxilla (Richard & Bernard, 1792) - lower Orinoco Valley in E Venezuela, the Guianas and N Brazil, S to R Madeira and E to N Maranhão.
L. r. hellmayri Chapman, 1915 - NE Venezuela (Paria Peninsula) and Trinidad.
L. r. bahiae Berlepsch, 1885 - C Brazil, from S Mato Grosso to Bahia.
L. r. reichenbachii Pelzel, 1870 - C & S Brazil (from Mato Grosso and Espírito Santo) S to Paraguay, NE Argentina (Misiones) and Uruguay.



Descriptive notes. 28 cm; 115-183 g. Forehead greyish to bluish white becoming bluish grey on crown; nape and hindneck greyish purple with some iridescence; throat and feathers bordering orbital skin pinkish white to white; rest of face buff to pinkish buff; breast and sides of neck greyish pink becoming white on belly and undertail-coverts; outer webs of undertail-coverts brown; upperparts olive-brown with hint of bronze or purplish on upper mantle and inner wing-coverts; primaries darker with less olive, outer webs fringed buff; underwing-coverts and mid-underside of remiges chestnut; central rectrices olive-brown, outer ones blackish with

conspicuous white tips; iris yellow or brown; lores and orbital skin red; bill black; legs and feet red. Female browner than male, flanks more olivaceous; upperparts green tinged, not purplish as male. Juvenile similar to female, but contour feathers often rusty-edged and breast barred rust and drab brown. Races rather similar, differing mainly in coloration (redder, pinker or greyer), and also in size.

Habitat. Occupies forest, particularly humid forest, avoiding arid areas; sometimes encountered on forest edge and in clearings; in Colombia, found in *várzea*, *terra firme* and gallery forests. In Venezuela, N of R Orinoco occurs up to 550 m; locally up to 2200 m in SE Brazil.

Food and Feeding. Little known. Takes seeds and probably insects from forest floor; once observed feeding on *Costus* fruit.

Breeding. On Trinidad, breeds in all months, except Sept-Oct; nest recorded in Jan in Surinam; most nests late Nov to mid-Feb in French Guiana, with lesser peak late Mar to mid-Apr. Nest platform of twigs 1-7.5 m above ground in a low bush or tree; in French Guiana, often uses the palm *Astrocaryum paramacca* for nesting in. Lays 1-2 creamy white eggs. No further information available.

Movements. No information. Presumably sedentary.

Status and Conservation. Not globally threatened. Few details available, but species reckoned to be common throughout much of its sizeable range, e.g. in Colombia; fairly common in Iguazú National Park (NE Argentina). Research required.

Bibliography. Anon. (1983), Arballo (1990), Belcher & Smooker (1936), Belton (1984), Canevari *et al.* (1991), ffrrench (1980), Friedmann (1948b), Graves & Zusi (1990), Guix (1995), Haverschmidt & Mees (1994), Hayes (1995), Hellmayr & Conover (1942), Herklots (1961), Hilty & Brown (1986), Ingels (1976, 1982), Meyer de Schauensee & Phelps (1978), de la Peña (1988), do Rosário (1996), Rösler (1996), Rutgers & Norris (1970), Sick (1985, 1993), Snyder (1966), Stotz *et al.* (1996), Tostain (1989), Tostain *et al.* (1992).

136. Grey-headed Dove

Leptotila plumbeiceps

French: Colombe à calotte grise

Spanish: Paloma Montaraz Cabecigrís

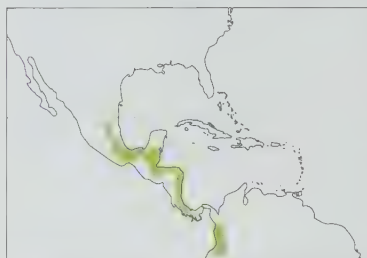
German: Bonapartetaube

Taxonomy. *Leptoptila* [sic] *plumbeiceps* P. L. Slater and Salvin, 1868. Vera Paz, Guatemala. May form superspecies with *L. rufaxilla* and *L. pallida*, and possibly also with *L. battyi* and *L. wellsii*, and all five have been considered conspecific. Also related to *L. verreauxi*. Two subspecies recognized.

Subspecies and Distribution.

L. p. plumbeiceps P. L. Slater & Salvin, 1868 - E Mexico through Belize, E Guatemala. Caribbean slope of Honduras and Nicaragua to coastal W Costa Rica, and S to W Colombia.

L. p. notius J. L. Peters, 1931 - Caribbean slope of W Panama.



Descriptive notes. 23.5-26 cm; 139-205 g. Forehead pale bluish grey becoming slightly darker on crown, nape, upper mantle and sides of neck; face and ear-coverts pinkish buff becoming pale pink on breast; throat, belly and undertail-coverts white; upperparts olive brown washed rufous; underwing chestnut; central rectrices dark olive brown, other rectrices darker, outer three black with white tips; bill black; legs and feet pink. Female has breast suffused greyish fawn. Juvenile more olivaceous above than adult, with dark subterminal bars to feathers; coverts suffused rusty fawn or red; breast feathers drab brown, shafts and tips tawny producing barred appearance. Race *notius* darker, and more olive above.

Habitat. Typically inhabits interior of humid forest; also second growth and forest edge, especially in Colombia, where appears to occupy drier forest types. In most of Central America occurs from sea-level up to 900 m, but locally to 1500 m in Honduras; in Colombia, generally found at 1000-1800 m, but up to 2600 m around Mt Puracé.

Food and Feeding. No information available.

Breeding. In Colombia, 4 birds in breeding condition taken in Jan, Puracé. No further information.

Movements. Resident.

Status and Conservation. Not globally threatened. Rather patchily distributed and local, though considered to be fairly common throughout much of its distribution; common to fairly common from SE Mexico to N Honduras, but less numerous further N; uncommon and local in Colombia. Despite sizeable range, including several zones where ornithological investigation has been notable, species remains surprisingly poorly known; situation perhaps exacerbated somewhat by taxonomic confusion. Research required in order to establish basic details of biology and ecology.

Bibliography. Anon. (1983), Binford (1989), Blake (1953), Dearborn (1907), Geier (1997), Hellmayr & Conover (1942), Hilty & Brown (1986), Howell & Webb (1995a), Land (1970), Monroe (1968), Ridgely & Gwynne (1989), Slud (1964, 1980), Stiles & Skutch (1989), Stotz *et al.* (1996), Wetmore (1968).

137. Pallid Dove

Leptotila pallida

French: Colombe pâle

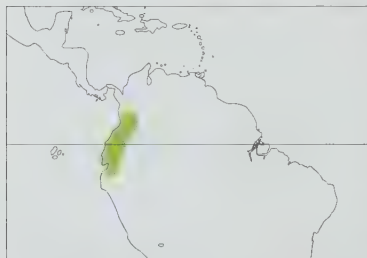
German: Fahлтаube

Spanish: Paloma Montaraz Pálida

Taxonomy. *Leptotila* [sic] *pallida* Berlepsch and Taczanowski, 1884, Chimbo, Ecuador.

Formerly considered a race of *L. rufaxilla*; these two may form superspecies with *L. plumbeiceps*, and possibly also with *L. battyi* and *L. wellsii*. Monotypic.

Distribution. Tropical lowlands of Pacific coast in W Colombia (from R San Juan) and Ecuador (S to Loja).



Descriptive notes. 23-26 cm. Forehead, face and throat white, becoming grey on crown and purplish grey on nape and hindneck; sides of neck and breast pale vinaceous; belly and undertail-coverts white; upperparts chestnut brown, some chestnut red on outer wing-coverts, uppertail-coverts and central rectrices; fresh feathers tinged purple; some purple iridescence on hindneck and upper mantle; primaries dark greyish brown fringed rusty; underwing chestnut; outer rectrices dark chestnut with blackish subterminal band and white tip; iris yellow; legs and feet pinkish red to brownish red; bill black. Female less reddish brown, pink and grey areas duller.

Habitat. Inhabits Chocó lowlands, in tropical lowland evergreen forest, dry semi-deciduous woodland and secondary forest, from sea-level up to 800 m. Typically recorded singly or in pairs.

Food and Feeding. No information available.

Breeding. A breeding condition male was taken in Dec. No further information.

Movements. No information.

Status and Conservation. Not globally threatened. Poorly known, being restricted to zone of rather limited ornithological investigation. Reported to be locally fairly common throughout much of its range; area of distribution small, but still relatively well conserved in parts, especially in N. Present in several protected areas, e.g. at Río Palenque and Tinalandia (W Ecuador). Extensive research required.

Bibliography. Butler (1979), Dunning (1982), Hellmayr & Conover (1942), Hilty & Brown (1986), Meyer de Schauensee (1964, 1982), Stotz *et al.* (1996), Williams & Tobias (1994).

138. Brown-backed Dove

Leptotila battyi

French: Colombe du Panama

German: Panamataube

Spanish: Paloma Montaraz de Coiba

Other common names: Battys Dove

Taxonomy. *Leptotila* [sic] *battyi* Rothschild, 1901, Coiba Island.

Has been considered part of a superspecies with *L. rufaxilla*, *L. plumbeiceps*, *L. pallida* and *L. wellsii*, and all five have been considered conspecific; most commonly placed within *L. plumbeiceps*, but has different vocalizations. Also related to *L. verreauxi*. Two subspecies recognized.

Subspecies and Distribution.

L. b. malae Griscom, 1927 - Pacific slope of Panama in S Veraguas and W Herrera, including Cebaco I. *L. b. battyi* Rothschild, 1901 - Coiba I (off SC Panama).

Descriptive notes. 23.5-25.5 cm. Forehead pale grey becoming slate grey on crown and nape; hindneck brownish grey; rest of upperparts chestnut brown; alula, primary coverts and primaries fuscous black; middle rectrices concolorous with back, rest brown basally but brownish black subterminally or terminally; outer two rectrices tipped brownish white; malar, suborbital, auricular regions and sides of



throat vinaceous drab to vinaceous grey, becoming slate grey on sides of neck and pale brownish drab on median portion of foreneck; upper breast pinkish, paler pinkish or buffy pink on lower breast; belly and vent buffy white; flanks mixed buffy brown and pale pinkish buff; underwing, inner webs of primaries and secondaries rufous; bill black; iris yellow or greenish yellow; bare loreal area dull red; legs and feet dull red or pinkish red. Female duller on back and breast. Juvenile has forehead, crown, neck and upper breast brown edged cinnamon; greater wing-coverts with narrow cinnamon tip and dark grey subterminal bar. Race *malae* deeper brown,

and slightly paler on head and breast.

Habitat. Occupies forest and swamps, on Coiba I especially near river mouths. Calls from low perches in forest.

Food and Feeding. Virtually nothing known. Feeds on the ground, usually in groups of 2-3.

Breeding. One immature was collected in May. No further information.

Movements. Resident.

Status and Conservation. Not globally threatened. Currently considered near-threatened. In 1960's reported still to be common on Coiba I, although flesh much appreciated, and birds regularly trapped and sold by local convicts; apparently sparse in mainland part of range. Virtually nothing known of biology and ecology, in part as a result of taxonomic confusion; extensive research required. Highly restricted range; survey work needed, in order to establish real conservation status and requirements.

Bibliography. Anon. (1983), Hellmayr & Conover (1942), Ridgely & Gwynne (1989), Ridgway (1916), Stotz *et al.* (1996), Wetmore (1957, 1968), Wolters (1975).

139. Grenada Dove

Leptotila wellsii

French: Colombe de Grenade

German: Welltaube

Spanish: Paloma Montaraz de Grenada

Other common names: Wells's/Whistling/Mountain Dove

Taxonomy. *Engyptila wellsii* Lawrence, 1884, Grenada, Lesser Antilles.

Has been considered part of a superspecies with *L. rufaxilla*, *L. plumbeiceps*, *L. pallida* and *L. battyi*, and all five have been considered conspecific. Also related to *L. verreauxi*. Monotypic.

Distribution. Grenada, in S Lesser Antilles.



Descriptive notes. 28-31 cm; 200 g. Face and forehead pale pinkish becoming greyish then dull brown on crown and nape; throat white; neck and upper breast pinkish buff becoming white on lower breast, belly and undertail-coverts; flanks light brown; upperparts reddish brown to olive; iris brown, carmine orbital ring; bill black; legs and feet red. Sexes alike.

Habitat. Dry-scrub woods in lowlands and on hillside up to 150 m. At Mt Hartman estate, habitat consists of deciduous thorn-scrub thickets, with canopy up to 6-8 m, comprised of *Acacia*, *Bauhinia unguiculata* and *Randia mitis*; also some emergent trees such as *Bursera semiruba*, *Glivicia*, *Pithecellobium*, *Tabebuia* and *Tecona*. Prefers areas consisting of fairly closed canopy with large patches of bare ground and much shrubbery; the legume *Haematoxylum campechianum* is dominant in such areas. Male may sing from branch 1-6 m above ground.

Food and Feeding. No information on diet. Forages exclusively on the ground, probably for seeds. Some birds observed foraging near clearing edges but never outside forest.

Breeding. Season Dec-Feb and Jul, but may vary according to rainfall and therefore differ in different parts of the island; males heard singing during survey between Dec 1989 and Jan 1990. One nest, found on a palm frond 4 m above ground in Jan, subsequently had a nestling in mid-Feb. Clutch 2 white eggs.

Movements. Sedentary.

Status and Conservation. **CRITICALLY ENDANGERED.** Few population estimates until late 1980's, although species long considered to be rare. Highly threatened due to continuing habitat destruction and alteration to make way for plantations, residential and tourist construction developments; possibly compounded by fledgling predation by introduced mongooses. Almost entirely restricted to SW corner of Grenada, where fewer than 70 individuals remaining; population census in 1991 revealed 44-50 birds, but by Apr 1994 there had been many new clearings for agriculture. Another small population at Halifax Harbour, where significant human disturbance from squatters and a rum distillery was evident in Apr 1994; another at Beausejour, but both of these are feared likely to become extinct. Formerly occurred in NE Grenada, including a number of offshore islands, but not recorded in this area since 1977, and now presumed extinct there. Until 1996, conservation efforts to secure the species' survival had been largely ineffective; species afforded legal protection from hunting and egg-collecting, although these are not significant threats; although a moratorium against new ridge-top developments in SW Grenada was instituted, it has not been enforced. However, in 1996, the Mt Hartman estate, where three-quarters of remaining wild population found, was declared a National Park; in 1997, work began on a recovery plan for the species, which was declared the island's national bird in 1991.

Bibliography. Anon. (1983, 1997e), Blockstein (1988b, 1988c, 1991), Blockstein & Hardy (1989), Bond (1956, 1985), Collar & Andrew (1988), Collar, Crosby & Stattersfield (1994), Collar, Gonzaga *et al.* (1992), Hellmayr & Conover (1942), Johnson (1988), King (1978/79), Stotz *et al.* (1996), Wauer (1996), Wunderle (1985).

140. Caribbean Dove

Leptotila jamaicensis

French: Colombe de la Jamaïque

German: Jamaikataube

Spanish: Paloma Montaraz Jamaicana

Other common names: Ground/Jamaican/Violet/White-fronted/White-bellied Dove, White-belly

Taxonomy. *Columba jamaicensis* Linnaeus, 1766, Jamaica.

Related to the *L. verreauxi* superspecies complex. Four subspecies recognized.

Subspecies and Distribution.

L. j. gaumeri (Lawrence, 1885) - SE Mexico in N Yucatán Peninsula, islands of Holbox, Mujeres and Cozumel, NE Belize (Ambergris Cay), and Honduran islands of Barbareta, Roatán and Little Hog.

L. j. collaris (Cory, 1886) - Cayman Is.
L. j. jamaicensis (Linnaeus, 1766) - Jamaica.
L. j. neoxena (Cory, 1887) - San Andrés I (off CE Nicaragua).
Introduced (*jamaicensis*) to New Providence, Bahamas.



Descriptive notes. 29-33 cm; 117-190 g. Forehead, face and throat white becoming grey on hindcrown and iridescent purple on nape; mantle and sides of neck rosy vinaceous, conspicuously iridescent with green or purple sheen, or both; breast light greyish vinaceous; belly and undertail-coverts white; upperparts olive-brown, outer webs of primaries with narrow white edges; underwing chestnut; conspicuous white band on front of folded wing; central rectrices greyish brown, outer ones black with white tips; iris white or with an inner white ring surrounded by a red ring; orbital skin dull purple; bill black, grey at base; legs and feet red. Female with duller

neck iridescence. Juvenile duller than adult with most covert feathers edged rufous; neck and breast barred dull or pale reddish brown in iridescent areas. Race *gaumeri* slightly smaller and more oliveaceous, with less bright neck iridescence and slightly darker vinaceous breast; *neoxena* intermediate between previous race and nominate; *collaris* similar to nominate but averages slightly smaller.

Habitat. Typically in semi-arid habitat, preferring areas with some shrub or tree cover, usually in lowlands. In Jamaica, inhabits dry limestone forest, but commoner in secondary forest in foothills; also frequents gardens and orchards; in montane forests in Blue Mts ranges up to 2000 m.

Food and Feeding. In Jamaica, seeds identified include those of orange, naseberry and red birch; small snails also sometimes taken. Forages on the ground.

Breeding. Season Mar-May. Nest placed in tree or shrub, seldom high above ground; in Jamaica, found in logwood trees or in low bushes; ground nests have also been found. Usual clutch 2 white eggs.

Movements. Resident throughout range.

Status and Conservation. Not globally threatened. Common to fairly common in Mexican part of range; locally common in Jamaica and on W side of San Andrés I; uncommon on Grand Cayman and New Providence, and rare on Cayman Brac. Was introduced onto New Providence, Bahamas, following hurricanes in 1920's.

Bibliography. Alderson (1903), Anon. (1983), Bond (1985), Brudenell-Bruce (1975), Downer & Sutton (1990), Field (1894), Hellmayr & Conover (1942), Howell & Webb (1995a), Johnston (1975), Lack (1976), Lever (1987), Monroe (1968), Stotz *et al.* (1996), Wunderle *et al.* (1992).

141. Grey-chested Dove

Leptotila cassini

French: Colombe de Cassin **German:** Cassintaube **Spanish:** Paloma Montaraz Pechigrís
Other common names: Cassin's/Grey-breasted Dove

Taxonomy. *Leptotila* [sic] *cassini* Lawrence, 1867, Panama.

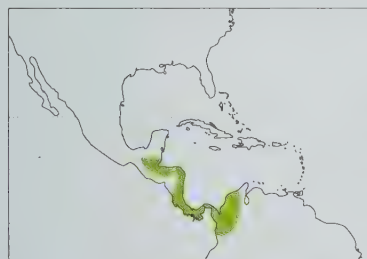
Forms a superspecies complex with *L. conoveri* and *L. ochraceiventris*. Three subspecies recognized.

Subspecies and Distribution.

L. c. cerviniventris P. L. Slater & Salvin, 1868 - Caribbean lowlands of Guatemala S through Belize, Honduras and Nicaragua to NW Costa Rica and W Panama (Chiriquí Lagoon).

L. c. rufinucha P. L. Slater & Salvin, 1873 - SW Costa Rica and NW Panama (Chiriquí).

L. c. cassini Lawrence, 1867 - Canal Zone in Panama SE to lower Cauca-Magdalena region in N Colombia.



Descriptive notes. 22.5-28 cm; 132-179 g. Forehead pinkish grey; crown and nape dark brown; throat white; breast vinaceous grey becoming iridescent greyish purple on hindneck; belly vinaceous, undertail-coverts white; upperparts olive-brown with green or purple iridescence on mantle and inner wing-coverts; primaries and rectrices darker than rest of upperparts; outer two rectrices white-tipped; underwing-coverts chestnut, some chestnut on underside of primaries; iris greyish yellow, yellow to greenish yellow; orbital skin grey but dull red at posterior angle and loreal region; legs and feet red; bill black, lores red. Female darker. Races differ mainly in

coloration; *rufinucha* paler with purpler breast, rusty buff nape and crown contrasting with pale forehead; *cerviniventris* similar to previous race but stronger purplish pink on breast.

Habitat. Prefers second-growth forests and *Heliconia* thickets, ranging up to 1400 m. Occurs on Caribbean slope of Costa Rica from sea-level to 750 m, but occurs only locally on S Pacific slope to 1200 m. In Panama, usually in lowlands on Caribbean slope, but as high as 1284 m in Pacific foothills of W Chiriquí.

Food and Feeding. Diet poorly known; species takes seeds and some small insects. Terrestrial in its habits; encountered singly or in pairs, never in flocks.

Breeding. In Costa Rica, season Feb-May and Jul-Sept; in Panama, Feb-Sept; in Colombia, 10 birds taken in breeding condition, Jan-Apr. Nest is typically a shallow concave platform of sticks, petioles and straw 1-5 m above ground on horizontal branch of a tree, in thicket or in vine tangle. Clutch consists of 2 white to pale buff eggs.

Movements. Resident from Mexico to N Honduras, and probably elsewhere.

Status and Conservation. Not globally threatened. Poorly known, but considered to be fairly common throughout most of its range; fairly common from Mexico to N Honduras; uncommon in Colombia. Research required.

Bibliography. Blake & Loisele (1991), Carriker (1910), Hallinan (1924), Hellmayr & Conover (1942), Hilty & Brown (1986), Howell & Webb (1995a), Land (1970), Monroe (1968), Paynter (1957), Ridgely & Gwynne (1989), Skutch (1964), Slud (1964), Stiles & Skutch (1989), Stotz *et al.* (1996), Wetmore (1968).

142. Ochre-bellied Dove

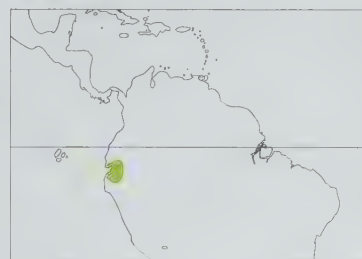
Leptotila ochraceiventris

French: Colombe de Chapman **Spanish:** Paloma Montaraz Ventriocro
German: Ockerbauchaube
Other common names: Buff bellied/Ochraceous-bellied Dove

Taxonomy. *Leptotila ochraceiventris* Chapman, 1914, Zaruma, El Oro, Ecuador.

Forms a superspecies with *L. cassini* and *L. conoveri*. Monotypic.

Distribution. Andes and lowlands from SW Ecuador (Manabí) to NW Peru (Tumbes, Piura).



Descriptive notes. 23-25 cm; c. 146 g. Forehead whitish pink becoming rusty purple on crown and iridescent purple on hindneck and upper mantle; rest of upperparts dark olive-brown, some bronzy green or purplish iridescence on mantle and wing-coverts; throat white; front of neck buff; breast vinaceous becoming buff on lower breast, flanks and belly; undertail-coverts white with buffy tinge; underwing chestnut; central rectrices dark brown, outer ones black with white tips; iris yellow. Sexes similar.

Habitat. Forest floor and undergrowth, often seen walking quietly over areas of thick leaf litter; dense understorey of small trees and woody

vines is important component of this species' habitat. Originally occurred right down to sea-level, but now largely confined to zone at 500-1800 m, occasionally up to 2625 m, with 3 recent records at 80-200 m in Guayas. Favours both moist evergreen and dry deciduous forest where *Ceiba trichistandra* and *Cavamillesia platentifolia* dominate. Also found in lower montane forest, semi-deciduous and humid cloud forest. Calls c. 2 m or more above ground.

Food and Feeding. No precise information on diet. Favours forest floor and understorey to 4 m above ground, although has occasionally been noted feeding higher up on fruiting trees; once observed plucking a fruit from a *Trichilia* tree. Will gather to drink with larger numbers of commoner doves, especially *L. verreauxi*; usually recorded singly or in pairs, but occasionally up to 5 together at drinking pools.

Breeding. Almost no information; nest, eggs and nesting are undescribed; singing activity in both evergreen and deciduous habitat suggests that species breeds in both. In SW Ecuador, most song activity is in Jan-Apr, with a less pronounced peak in Aug; birds in breeding condition in Aug, Sept and Apr; display observed in Jan.

Movements. Appears to make seasonal movements which are not fully understood, e.g. found only in Jul-Aug at Piñas (S Ecuador), despite intensive searches throughout year. May perhaps vacate deciduous forest during driest part of dry season; however, at a site in N Guayas, species recently discovered to be present all year round.

Status and Conservation. **VULNERABLE.** In early years of 20th century, reported to be not uncommon in forested SW Ecuador, but only observed twice during 1926-1980; most populations now small and highly fragmented, due to forest destruction throughout its range. Indeed, all forest types within the species' range have been greatly diminished and, without rapid intervention, may face total destruction. Most semi-humid areas below 700 m in SW Ecuador and Piura (NW Peru) are now cultivated, and most of the original type localities reported by Chapman are now totally deforested. Although recorded in at least one severely degraded area in SW Ecuador, where 2 birds were seen feeding along edge of maize field, it is unknown how long birds could survive in such habitat. Species reported as common, with up to 25 birds seen in a morning and 15-30 birds daily in late Feb and Mar 1986, at Campo Verde, Peru, but typically occurs at much lower densities, although it is speculated that a significant population may remain in unsurveyed forests in W Azuay (Ecuador) and possibly at Cerro Blanco reserve, Guayas. Occurs in three protected areas: Machalilla National Park, Cerro Blanco reserve, and Tumbes National Forest; however, even within such protected areas, forest understorey is vulnerable to exploitation for firewood by local people, who also graze cattle, semi-wild goats and mules in these areas.

Bibliography. Best (1992, 1994), Best & Clarke (1991), Best & Kessler (1995), Best *et al.* (1993), Butler (1979), Chapman (1926), Collar & Andrew (1988), Collar, Crosby & Stattersfield (1994), Collar, Gonzaga *et al.* (1992), Dunning (1982), Fjeldså & Krabbe (1990), Hellmayr & Conover (1942), Parker & Carr (1992), Parker, Parker & Plenge (1982), Parker, Schulenberg *et al.* (1995), Pople *et al.* (1997), Robbins & Ridgely (1990), Rösler (1996), Stotz *et al.* (1996), Wege & Long (1995), Williams & Tobias (1994).

143. Tolima Dove

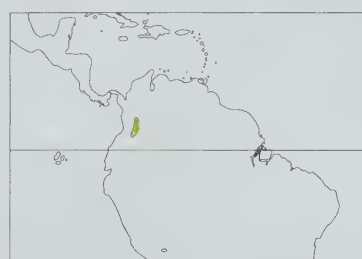
Leptotila conoveri

French: Colombe de Conover **German:** Tolimataube **Spanish:** Paloma Montaraz de Tolima
Other common names: Conover's Dove

Taxonomy. *Leptotila conoveri* Bond and Meyer de Schauensee, 1943, Colombia.

Forms a superspecies with *L. cassini* and *L. ochraceiventris*. Monotypic.

Distribution. E slope of C Andes of Colombia, from Tolima to Huila.



Descriptive notes. 22.5-25 cm. Crown blue-grey or dark grey, throat white, hindneck vinaceous with violet gloss; upper mantle vinaceous grey with violet iridescence, rest of upperparts dark grey with purple iridescence, wings browner; breast vinaceous pink sharply demarcated from buff lower breast and belly; undertail-coverts white; underwing chestnut; tail slaty, outer rectrices tipped white, but less broadly than in partially sympatric *L. verreauxi*.

Habitat. Humid forest and bushy forest borders in subtropical zone, possibly extending to lower limit of temperate zone; altitude range 1600-2255 m.

Food and Feeding. No information available.

Breeding. Birds in breeding condition collected in Mar-Apr and Jun. No further information available.

Movements. No information.

Status and Conservation. **ENDANGERED.** Little known but species seems to be threatened by deforestation. Numbers unknown in tiny overall range; species was surveyed in 1988-1990, N & W of Ibaque, Tolima; one bird seen near Jutans and 2 near Tapias. Only recorded at 3 localities in 1990's. Type-series was collected in a heavily forested area at the head of Toche Valley; much of this habitat has been destroyed, but recent records are from degraded habitat, e.g. coffee groves and secondary growth. Endemic wax palm (*Ceroxylum quindiuense*) forests of Toche area, at 2000-2800 m, have been subject of a broad integrated conservation programme; hopefully this will benefit present species and other threatened species in the area, e.g. Yellow-eared Parrot (*Ognorhynchus icterotis*), Bicoloured Antpitta (*Grallaria rufocinerea*) and Yellow-headed Brush-finch (*Atlappetes flaviceps*).

Bibliography. Collar & Andrew (1988), Collar, Crosby & Stattersfield (1994), Collar, Gonzaga *et al.* (1992), Dunning (1982), Fjeldså & Krabbe (1990), Hellmayr & Conover (1942), Hilty (1985), Hilty & Brown (1986), King (1978/79), Meyer de Schauensee (1964, 1982), Stotz *et al.* (1996), Wege & Long (1995).



144

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146

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ssp saphirina

ssp leucometopius

149

ssp purpurata

148

ssp caniceps

150

♂

♀

153

152

ssp bourcierii

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156

155

ssp erythropareia

ssp frenata

154

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157

159

ssp martinica

ssp montana

158

ssp violacea

ssp albiventer

160

PLATE 13

inches 6
cm 15

Genus *GEOTRYGON* Gosse, 1847

144. Purplish-backed Quail-dove

Geotrygon lawrencii

French: Colombe de Lawrence **Spanish:** Paloma-perdiz de Lawrence
German: Purpurrückentaube
Other common names: Lawrence's Quail-dove

Taxonomy. *Geotrygon lawrencii* Salvin, 1874, Veraguas, Panama. Like most of congeners, formerly placed in genus *Oreopeleia*. Forms superspecies with *G. carrikeri*, with which usually considered conspecific. Monotypic.
Distribution. Costa Rica and Panama (E to Darién).



Descriptive notes. Male 26-27 cm, female 25 cm; 220 g. Forehead greyish white becoming bluish grey to greyish green on crown, nape, hindneck and edge of mantle; rest of mantle and innermost lesser wing-coverts dull purple; rest of upperparts olive-brown with reddish tinge on outer wing-coverts and secondaries; primaries blackish brown, the three next to the outermost with buff on outer web and strongly emarginated; central rectrices purple-brown, outer ones blackish tipped grey; face and throat white with black malar stripe and black line from bill to eye; neck and breast slaty grey with greenish sides; centre of belly and undertail-coverts whitish buff to cinnamon brown; flanks chocolate brown; iris brownish orange to red; orbital skin and legs magenta; bill black, cere dusky. Sexes alike. Juvenile has crown barred dusky; lacks grey areas and green and purple of mantle, has a less conspicuous face pattern; narrow blackish subterminal bars and buff fringes to most feathers.

Habitat. Inhabits dense, cool and wet forest in montane areas; occurs at 400-800 m on Caribbean slopes, but up to 1100 m in SE, from Cordillera de Guanacaste S to Panama, and up to 2600 m in some areas. Male calls from understorey.

Food and Feeding. Takes fruit, seeds, insects and worms. Feeds on ground, usually singly or in pairs.

Breeding. Breeds in Costa Rica Jun-Oct, but apparently earlier in Panama, where 1 nest with egg discovered in mid-Jun and a not quite fully grown immature female taken in early Jun. Nest of twigs loosely made but bulky, often resting on a pad of leaves; nest has central depression lined with finer materials and is placed in dense understorey up to at least 1.5 m above ground. Lays 1 pale buff egg.

Movements. Considered resident in Panama. Typically walks or runs, rather than flying, away from perceived danger, e.g. human observers, but will occasionally flush to an elevated perch.

Status and Conservation. Not globally threatened. Status poorly known, but species considered to be fairly common though local. However, could become threatened if forest habitat continues to be destroyed at present rates, particularly as range is rather restricted. Populations should be monitored.

Bibliography. Anon. (1983), Hartman (1961), Hellmayr & Conover (1942), Hernández-Baños *et al.* (1995), Olson *et al.* (1968), Ridgely & Gwynne (1989), Ridgway (1916), Slud (1964), Stiles & Skutch (1989), Stotz *et al.* (1996), Wetmore (1968).

145. Veracruz Quail-dove

Geotrygon carrikeri

French: Colombe de Tuxtla **German:** Veracruztaube **Spanish:** Paloma-perdiz de Veracruz
Other common names: Carriker's/Purplish-backed(!) Quail-dove

Taxonomy. *Oreopeleia lawrencii carrikeri* Wetmore, 1941, Sierra de Tuxtla, Veracruz, Mexico. Like most of congeners, formerly placed in genus *Oreopeleia*. Forms superspecies with *G. lawrencii*, with which usually considered conspecific; some similarity in vocalizations reported; however, the closest populations of the two are 1500 km apart. Monotypic.

Distribution. Volcán de San Martín and Sierra de Santa Marta, in Sierra de los Tuxtlas, SE Veracruz (SE Mexico).



Descriptive notes. 29-31.5 cm. Similar to *G. lawrencii*, but distinctly larger, as well as paler all over, notably lighter on wing-coverts, lower back and rump; centre of back and scapulars lighter brown with a more pronounced purple tinge; flanks light brown as opposed to chocolate; breast light grey rather than slaty; purplish iridescence on upper surfaces of rectrices in *G. lawrencii* absent in present species; black malar stripe distinctly wider; no overlap in measurements of wing chord, tail and exposed culmen of the 2 taxa. Sexes alike. Juvenile darker all over, with cinnamon edging to feathers of upperparts, and buff barring on breast.

Habitat. Inhabits humid evergreen forest and cloud forest at 350-2100 m; canopy trees include *Bernoullia*, *Brosimum*, *Dussia*, *Ficus*, *Ilex*, *Phoebe*, *Pithecollobium*, *Talauma* and *Virola*. Found singly or in pairs.

Food and Feeding. No information. Probably takes fruit, seeds and invertebrates from the forest litter.

Breeding. Only nest found to date in mid-Oct 1962, at 500 m. Nest was loose intertwined platform supported by several crossed and slanted bamboo shoots; contained 1 pale pinkish egg, a colour unusual for the genus.

Movements. Considered resident.

Status and Conservation. ENDANGERED. Deforestation in the region of Sierra de los Tuxtlas was occurring at an intensive rate in late 1980's, with 84% of original forest on Volcán de San Martín having been felled by 1986 and forest clearance on Sierra de Santa Marta also proceeding very rapidly. Nonetheless, species was still described as common to fairly common within remaining habitat. A small patch of lowland forest has been set aside as the Estacion Biológica de Los Tuxtlas. More extensive areas of existing habitat require protection, if species is to maintain a viable population.

Bibliography. Andrie (1967), Anon. (1983), Collar *et al.* (1994), Hellmayr & Conover (1942), Hernández-Baños *et al.* (1995), Howell & Webb (1995a), Peterson (1993), Stotz *et al.* (1996), Wetmore (1941b, 1943).

146. Costa Rican Quail-dove

Geotrygon costaricensis

French: Colombe du Costa Rica **Spanish:** Paloma-perdiz Costarricense
German: Costa-Rica-Taube
Other common names: Buff-fronted Quail-dove

Taxonomy. *Geotrygon costaricensis* Lawrence, 1868, Costa Rica. Like most of congeners, formerly placed in genus *Oreopeleia*. Similar to *G. lawrencii* and *G. carrikeri* and probably related. Monotypic.

Distribution. Costa Rica and W Panama (E to Veraguas).



Descriptive notes. Male 24-28.5 cm, 310-330 g; female 25 cm, 225-283 g. Forehead buff or pinkish buff; crown, nape and occiput slate grey; hindneck greenish; upperparts reddish brown suffused purple; primaries and distal secondaries dusky; four central tail feathers dark reddish brown, the rest dusky grey tipped light grey; malar and suborbital regions white becoming grey near auriculars; black line from side of throat to below auriculars; underparts grey, tinged olive-green laterally, buffy on flanks, belly and vent; bill dusky, but carmine red at base; iris dark brown with carmine orbital ring; legs and feet carmine, soles of toes whitish. Sexes similar. Juvenile has forehead dull whitish tinged cinnamon; crown, nape and occiput faintly glossed green; back to uppertail-coverts dull chestnut, distinctly barred dusky and sometimes narrowly tipped cinnamon; foreneck and chest barred dusky brown, rest of underparts vermiculated cinnamon, notably in centre of belly.

Habitat. Montane evergreen forest, preferring higher elevations and wetter conditions. Occurs at 1000-3000 m, from Cordillera de Guanacaste to upland Veraguas.

Food and Feeding. Takes fruits, seeds and probably insects, gathered from the leaf litter. Forages on ground, singly or in loosely associated pairs.

Breeding. One nest in Costa Rica in late Jun. Nest was of green mosses and liverworts resting on a platform of coarse twigs, 4 m up on a shrub growing among bamboo in heavy oak forest; the nest contained 1 chick which was later taken by predator.

Movements. Resident.

Status and Conservation. Not globally threatened. In Costa Rica, most abundant on Caribbean slope at 1500-2000 m and on Pacific slope from 2000-2500 m. In Panama, considered rare in Chiriquí and only a few records in Veraguas. Due to deforestation, this species is probably declining, and populations require monitoring.

Bibliography. Anon. (1983), Hellmayr & Conover (1942), Hernández-Baños *et al.* (1995), Ridgely & Gwynne (1989), Ridgway (1916), Skutch (1964), Slud (1964), Stiles & Skutch (1989), Stotz *et al.* (1996), Wetmore (1968).

147. Russet-crowned Quail-dove

Geotrygon goldmani

French: Colombe de Goldman **German:** Goldmantaube **Spanish:** Paloma-perdiz de Goldman
Other common names: Mount Pirri/Goldman's Quail-dove

Taxonomy. *Geotrygon goldmani* Nelson, 1912, Panama.

Like most of congeners, formerly placed in genus *Oreopeleia*. Perhaps closely related to *G. linearis*. Two subspecies recognized.

Subspecies and Distribution.

G. g. oreas (Wetmore, 1950) - E Panama at Cerro Chucantí (Panamá Province).

G. g. goldmani Nelson, 1912 - E Panama (E Panamá Province, Darién) and extreme NW Colombia (Cerro Tacarcuna, R Tuna).



Descriptive notes. Male 26.5-28.5 cm, female 27-28 cm; 258 g. Similar to *G. lawrencii* but nape and crown russet brown, paler on forehead; malar suborbital stripe buff not white, hindneck brown rather than greyish green; wings and upperparts browner, tinged purple; grey breast less sharply demarcated from brown flanks; belly whitish grey; iris orange; orbital skin grey; eye-rims and gape red with red spot in front of eye; feet and legs red. Female has brown tinge to grey breast and wings less reddish brown. Juvenile dull cinnamon brown above, below dusky brown edged reddish buff. Race *oreas* darker.

On following pages: 148. Sapphire Quail-dove (*Geotrygon sapphirina*); 149. Grey-headed Quail-dove (*Geotrygon caniceps*); 150. Crested Quail-dove (*Geotrygon versicolor*); 151. Rufous-breasted Quail-dove (*Geotrygon chiriquensis*); 152. Olive-backed Quail-dove (*Geotrygon veraguensis*); 153. White-faced Quail-dove (*Geotrygon albifacies*); 154. Lined Quail-dove (*Geotrygon linearis*); 155. White-throated Quail-dove (*Geotrygon frenata*); 156. Key West Quail-dove (*Geotrygon chrysis*); 157. Bridled Quail-dove (*Geotrygon mystacea*); 158. Violaceous Quail-dove (*Geotrygon violacea*); 159. Ruddy Quail-dove (*Geotrygon montana*); 160. Blue-headed Quail-dove (*Stanoenas cyanocephala*).

Habitat. Subtropical regions in foothills and lower highlands of E Darién, at 750-1600 m. Also undergrowth in humid forests in foothills throughout E Panama into extreme NW Colombia, where recorded down to 90 m.

Food and Feeding. Feeds on seeds, some large; also known to swallow small stones, presumably as grit. Usually seen on forest floor.

Breeding. Virtually no information. One juvenile, not fully grown, found in mid-Oct in Chocó (NW Colombia).

Movements. Resident.

Status and Conservation. Not globally threatened. Currently considered near-threatened. Locally common in the montane forests of Darién. Race *oreas* is apparently uncommon within its minute range, restricted to the isolated Cerro Chucantí in Serranía de Majé. Species very poorly known; extensive research required, as well as surveys in order to establish population size and trends.

Bibliography. Anon. (1983), Dunning (1982), Hellmayr & Conover (1942), Hilty & Brown (1986), Meyer de Schauensee (1966, 1982), Ridgely & Gwynne (1989), Ridgway (1916), Robbins *et al.* (1985), Stotz *et al.* (1996), Wetmore (1968).

148. Sapphire Quail-dove

Geotrygon saphirina

French: Colombe saphir **German:** Saphirtaube **Spanish:** Paloma-perdiz Zafiro
Other common names: Purple Quail-dove

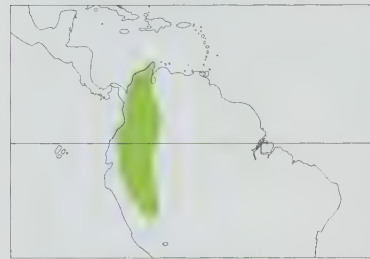
Taxonomy. *Geotrygon saphirina* Bonaparte, 1855, River Napo, Ecuador. Formerly separated in monospecific genus *Osculatia*. Apparently related to *G. lawrencii* and *G. costaricensis*. Race *purpurata* may represent distinct species. Three subspecies recognized.

Subspecies and Distribution.

G. s. purpurata (Salvin, 1878) - NW Colombia (N to upper Atrato Valley) S to NW Ecuador.

G. s. saphirina Bonaparte, 1855 - E Ecuador S to SE Peru (Cuzco) and extreme W Amazonian Brazil (Amazonas); probably also SE Colombia (Amazonas, Putumayo).

G. s. rothschildi (Stolzmann, 1926) - known only from Cadena in Marepata Valley (SE Peru).



Descriptive notes. 22-26 cm. White on forehead, throat and below eye; conspicuous purple-black malar stripe extending below and beyond ear-coverts; crown dark bluish grey becoming bronzy green on nape; bronzy hindneck, glossed with green, gold and purplish pink iridescence; deep slightly iridescent purple-brown mantle, back and inner wing-coverts, darkest on wing; blackish brown primaries with conspicuous small white spot on inner secondaries; rump and uppertail-coverts iridescent greenish or purplish blue; central tail feathers slaty black, outer ones blackish with blue-grey tips; breast pale grey becoming

white on belly; buff flanks and undertail-coverts; iris pale yellow, bill grey and black, and feet and legs reddish. Female tends to be less brilliantly coloured. Juvenile dark reddish brown throughout with darker subterminal bands and rusty fringes to most feathers; white areas less bright, dusky and rufous bars on sides of breast; less intense facial markings. Race *rothschildi* very similar to nominate; *purpurata* darker, crown and nape contrasting more sharply with white forehead, white wing spot absent, outermost rectrices with white spot, iris light red.

Habitat. Occupies undergrowth and ground level of lowland and montane evergreen forests, as well as advanced second growth; occurs at 600-1100 m, in W Colombia mostly in foothills and mountains.

Food and Feeding. No good data available. Probably takes seeds and small invertebrates. Apparently strictly terrestrial; typically occurs singly, or in well separated pairs.

Breeding. No information available.

Movements. No information.

Status and Conservation. Not globally threatened. Apparently very locally distributed, and considered uncommon in Colombia. Exact limits of distribution of this distinctive species poorly known; survey work required in order to establish range, and estimate population size and trends. Extensive research required.

Bibliography. Butler (1979), Davies *et al.* (1994), Dunning (1982), Hellmayr & Conover (1942), Hilty & Brown (1986), Meyer de Schauensee (1964, 1982), Parker *et al.* (1982), Sick (1993), Stotz *et al.* (1996), Traylor (1958), Williams & Tobias (1994), Willis (1987).

149. Grey-headed Quail-dove

Geotrygon caniceps

French: Colombe de Gundlach **German:** Gundlachtaube **Spanish:** Paloma-perdiz Camao
Other common names: Grey-faced Ground-pigeon; Hispaniolan Quail-dove (*leucometopius*)

Taxonomy. *Columba caniceps* Gundlach, 1852, Cuba.

Like most of congeners, formerly placed in genus *Oreopeleia*. Probably forms a superspecies with *G. versicolor*, with which shares chestnut underwing and lack of black head markings. Two subspecies recognized.

Subspecies and Distribution.

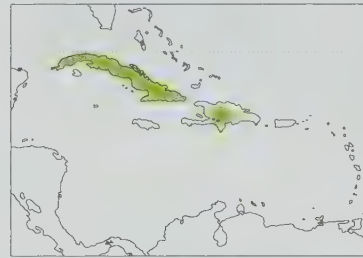
G. c. caniceps (Gundlach, 1852) - Cuba.

G. c. leucometopius (Chapman, 1917) - Dominican Republic.

Descriptive notes. Male 26-30 cm, female 27 cm; 210 g. Forehead greyish white merging gradually to grey on crown, occiput and nape; slight purplish iridescence on back of head; throat medium grey becoming darker on breast and cream on centre of belly; rufous vent and undertail-coverts; chestnut underwing, basal parts of inner webs and narrow fringe on outer primary webs; glossy purple mantle and sides of breast becoming bluish purple on lower back, rump and uppertail-coverts; dark brownish grey, tail grey. Female slightly duller. Juvenile has brownish grey forehead and pale grey throat; dark brown upperparts edged buff and chestnut brown underparts. Race *leucometopius* has white forehead and is darker throughout with richer iridescence.

Habitat. Tropical lowland forests bordering swamps in Cuba; montane forests and coffee plantations in Dominican Republic to at least 1800 m, although also known from two localities at sea-level. In Cuba, appears to prefer wetter areas than those frequented by *Stanoenas cyanocephala*.

Food and Feeding. Feeds on seeds and small invertebrates. Forages on the ground, frequently along tracks, but may perch up to 10 m above ground; usually singly or in pairs.



Breeding. Season Jan-Aug. Nest of twigs and leaves placed low in undergrowth, 1-3 m above ground. Clutch 1-2 beige-coloured eggs. In captivity: incubation 13 days; fledging 12 days.

Movements. Resident. Flight is swift and direct.

Status and Conservation. Not globally threatened. Currently considered near-threatened. Chief threats are habitat loss, hunting and introduced predators. One of the rarest doves on Cuba, where mainly recorded in W & C, and now very uncommon and local. Considered rarer than *Stanoenas cyanocephala* in Cuba,

where both species are regarded as constituting good eating and are consequently hunted using drop-traps baited with orange seeds. Also very rare in Dominican Republic, where known from three mountain ranges, namely Cordillera Central, Sierra de Baoruco and Sierra de Neiba; habitat destruction has reduced it to near extinction in two of these; remains locally fairly common only in Sierra de Baoruco. Might conceivably occur in Haiti, but intensive habitat destruction there suggests that any hypothetical populations would probably by now have been wiped out; in 1920's, local people reported a rare grey quail-dove, near summit of Morne La Selle.

Bibliography. Anon. (1983), Barbour (1943), Bond (1985), Collar & Andrew (1988), Dod (1987, 1992), Ezra (1925), Garrido (1986), Gotto (1997), Hellmayr & Conover (1942), Lack (1976), Llanes *et al.* (1987), Mitchell & Wells (1997), Nicolai (1969), Pérez-Rivera (1989a), Ridgway (1916), Rodríguez & Sánchez (1993), Rodríguez *et al.* (1989), Stotz *et al.* (1996), Sulley & Sulley (1992), Wetmore & Swales (1931).

150. Crested Quail-dove

Geotrygon versicolor

French: Colombe versicolore **German:** Kurzschopftaube **Spanish:** Paloma-perdiz Jamaica
Other common names: Jamaican Quail-dove, Blue Dove

Taxonomy. *Columbigallina versicolor* Lafresnaye, 1846, Jamaica.

Formerly listed as only member of *Geotrygon*, as most of congeners were placed in genus *Oreopeleia*; unique within current genus in possessing a conspicuous occipital crest. Forms a superspecies with *G. caniceps* with which it shares the chestnut underwing and lack of black facial markings. Monotypic.

Distribution. Jamaica.



Descriptive Notes. Male 27-31 cm, female 27-30 cm; 225 g. Forehead with stiffened hair-like feathers, dull black to greyish black; rest of crown and nape drab brown becoming grey at sides and rear; metallic bronze or bronze-green on side and hindneck; small nape crest; reddish buff on median line of throat and broad malar stripe extending across face and below eye; rest of face, neck and underparts grey; iridescent reddish purple mantle and lesser wing-coverts becoming bluish purple on scapulars, lower mantle and inner secondaries; primaries chestnut with blackish inner webs; rest of upperparts and tail greenish black

with some purple iridescence; belly and flanks chestnut; iris red with edge of eyelids scarlet; orbital skin grey; bill black; legs and feet pink. Female sometimes indistinguishable from male, but occasionally paler and browner than male on neck and belly. Juvenile duller than adult, most feathers edged rust.

Habitat. Montane forest down to mid-level wet limestone forest of John Crow Mts, Blue Mts, Mt Diablo and Cockpit Country. Occurs to as low as 100 m near Windsor in Cockpit Country, and as high as 1800 m. Absent from lowland, dry riverine forests and wooded cultivation.

Food and Feeding. Feeds on seeds and fallen fruit, and probably invertebrates; one small snail recorded. Feeds in deep shade of forest floor, searching in leaf litter; also occasionally along trails and even road edges.

Breeding. Mar-Jun. Nest of twigs placed close to the ground in vegetation and sometimes on the ground itself. Clutch 2 buff eggs. In captivity: incubation 13 days; fledging 12 days.

Movements. Resident.

Status and Conservation. Not globally threatened. Currently considered near-threatened. Fairly common locally (e.g. around Hasdwar Gap in Blue Mts), though apparently more so in wet years. Since this is a forest species, its survival will depend on the preservation of forests.

Bibliography. Anon. (1983), Bond (1985), Downer & Sutton (1990), Gosse (1847), Haynes *et al.* (1989), Hellmayr & Conover (1942), Lack (1976), Momot (1985), Nicolai (1969), Pérez-Rivera (1989a), Ridgway (1916), Rutgers & Norris (1970), Stotz *et al.* (1996), Varty (1991), Varty & Mitchell (1991), Wauer (1996), Wunderle *et al.* (1992).

151. Rufous-breasted Quail-dove

Geotrygon chiriquiensis

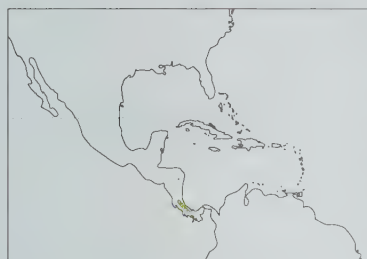
French: Colombe du Chiriqui **German:** Chiriquitaube **Spanish:** Paloma-perdiz de Chiriquí
Other common names: Chiriqui Quail-dove

Taxonomy. *Geotrygon chiriquiensis* P. L. Sclater, 1856, Boquete, Panama.

Like most of congeners, formerly placed in genus *Oreopeleia*. Sometimes considered conspecific with *G. linearis*. Monotypic.

Distribution. Costa Rica to W Panama (Chiriquí, Veraguas).

Descriptive notes. Male 27-31 cm, female 26-32 cm; 295-308 g. Crown slate grey becoming darker towards middle and rear, but paler on forehead; upperparts chestnut becoming purplish on upper back then olivaceous with greenish gloss on lower back; remiges dusky sometimes tinged chestnut; conspicuous black malar stripe; thin black short postocular line and thin black loreal stripe; chin and upper throat buffy white deepening to rufous on foreneck, chest and sides and becoming pale cinnamon buff on belly; flanks and undertail-coverts cinnamon brown; iris brownish orange, orbital skin red; cere and bill black; legs and feet purplish red. Female often indistinguishable from male, but usually darker on breast and grey of crown duller. Juvenile has upperparts including crown brown, with darker crown and occiput; rufescent wing-coverts, dusky subterminal bar or spot on wing-coverts and scapulars; foreneck, breast and sides similar to adult but with dull black bars.



Habitat. Understorey of mountain forests at mid-elevations from Cordillera de Guanacaste S to W Panama. Prefers drier forests to *G. costaricensis*. Occurs at 600-1700 m on Caribbean slope, but locally and in SE Costa Rica to 2000 m; on Pacific slope occurs at 1000-2500 m, occasionally up to 3100 m. Calls incessantly during breeding season from a perch 1-3 m above ground and sometimes from an empty nest. Regularly visits a rubbish dump beside Monteverde Cloud Forest Reserve.

Food and Feeding. Feeds on seeds, fallen fruit and small invertebrates. Occurs singly or in pairs feeding on the ground; birds may feed

along roads and trails in early morning.

Breeding. Eggs in late Aug in Panama; nest in Sept in Costa Rica. Nest is a shallow cup of leaves and twigs placed on the end of a branch of a slender tree overhanging a ravine; one was situated 2.5 m above ground in a coffee tree. Lays 2 buffy or creamy white eggs.

Movements. Resident. Flushes with rattling wings.

Status and Conservation. Not globally threatened. Very little information available on status but species is considered to be rather localized in both Costa Rica and Panama. Research required, as well as surveys to establish true status.

Bibliography. Anon. (1983), Blake (1956), Hellmayr & Conover (1942), Hernández-Baños *et al.* (1995), Ridgely & Gwynne (1989), Ridgway (1916), Rutgers & Norris (1970), Slud (1964), Stiles & Skutch (1989), Stotz *et al.* (1996), Wetmore (1968).

152. Olive-backed Quail-dove

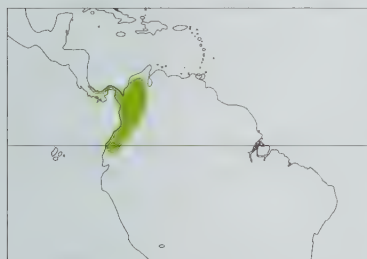
Geotrygon veraguensis

French: Colombe de Veragua **German:** Veraguataube **Spanish:** Paloma-perdiz de Veragua
Other common names: Veragua Quail-dove

Taxonomy. *Geotrygon Veraguensis* Lawrence, 1867, Veraguas, Panama.

Like most of congeners, formerly placed in genus *Oreopeleia*. Probably related to *G. costaricensis*; both have black malar stripe and black eyestripe. Monotypic.

Distribution. Caribbean slope of Costa Rica and Panama, and Pacific slope of E Panama (E Panamá Province) through W Colombia (E to Antioquia and lower Cauca Valley) to NW Ecuador (Esmeraldas).



Descriptive notes. Male 21-24.5 cm, female 21-22 cm; 155 g. Forehead white with grey or buff shading, becoming grey on crown then purple on hindcrown, nape and neck; upperparts dark olive-brown; white throat and facial stripes sometimes suffused buff; conspicuous black malar stripe; white or buffish white belly with dark reddish buff flanks and undertail-coverts; underwing chestnut; rest of plumage olive brown or purplish brown; greenish or purplish iridescence on neck, breast and upperparts; iris brown; orbital skin purplish red; bill and cere black; feet and legs reddish. Sexes alike, but female often has buff forehead and

little or no grey on crown. Juvenile similar to adults but feathers fringed rusty and lack iridescence. **Habitat.** Lowlands and foothills up to 900 m in dense wet forests, within which species appears to prefer wet ravines.

Food and Feeding. Feeds on seeds (including *Scleria*), berries and small invertebrates (including beetles). Forages singly or in separated pairs in understorey or on ground.

Breeding. Season Jan-Jul in Costa Rica; two specimens taken in Panama in Feb-Mar were near breeding condition, as were seven from Colombia in Jan-Apr; nest found in Jul in Canal Zone. Relatively bulky nest of twigs and rootlets lined with finer twigs, placed in vegetation usually 1-1.8 m above ground, often by a gully or stream. Clutch 2 buff eggs.

Movements. Resident. Usually flies only short distances, preferring to walk or run from perceived danger, but will flush with a slight rattle of the wings.

Status and Conservation. Not globally threatened. Fairly common in forested Caribbean lowlands of Costa Rica, N to Tortuguero. Absent from drier forests S of L Nicaragua and rare to locally uncommon in Caribbean lowlands of Panama. Also known from E Darién and from Panamá Province on Pacific slope. Uncommon and local in Colombia. Deforestation undoubtedly poses a threat to this species.

Bibliography. Anon. (1983), Blake & Loiselle (1991), Butler (1979), Haffer (1975), Hellmayr & Conover (1942), Hilty & Brown (1986), Meyer de Schauensee (1966, 1982), Ridgely & Gwynne (1989), Ridgway (1916), Slud (1964), Stiles & Skutch (1989), Stotz *et al.* (1996), Wetmore (1968).

153. White-faced Quail-dove

Geotrygon albifacies

French: Colombe des nuages **German:** Sclatertaube **Spanish:** Paloma-perdiz Cariblanca

Taxonomy. *Geotrygon albifacies* P. L. Slater, 1858, Jalapa, Veracruz.

Like most of congeners, formerly placed in genus *Oreopeleia*. Sometimes considered conspecific with *G. linearis*, and the two may form a superspecies. Monotypic.

Distribution. Locally in mountains of Mexico (SE San Luis Potosí, Hidalgo and C Veracruz to Guerrero, N & SC Oaxaca and N & S Chiapas) to C Guatemala, W El Salvador, NW Honduras and NW Nicaragua.

Descriptive notes. Male 28-36 cm, female 28-31 cm; 294-339 g. Resembles *G. chiriquensis* but lacks black malar stripe, and breast lighter and greyer; forehead white becoming pale grey on crown and darker grey on occiput and sides of nape; hindneck and sides brown with faint olivaceous bronze gloss on lower hindneck; sides of neck with distinctive dark furrows; rest of upperparts chestnut with violet gloss on upper back; primaries and coverts dusky brown; chin and throat pale buff; lower foreneck greyish buff deepening to brown on chest and upper breast; flanks buffy cinnamon, becoming buffy white on centre of belly; undertail-coverts cinnamon buff; underwing greyish brown; iris orange or red; bill black; legs and feet red. Sexes similar. Juvenile deep brown above



with more rufescent wing-coverts; much of body barred dusky, although back sometimes uniform brown; upperparts may have cinnamon edges to feathers.

Habitat. Humid evergreen and pine evergreen forests at 1000-2700 m, occasionally down to 300 m; inhabits cloud forest in Atlantic and Pacific regions of Oaxaca (S Mexico), but may range down to tropical semi-deciduous forest on Pacific slope.

Food and Feeding. No information. Presumably similar to congeners.

Breeding. Possibly nests all year round in El Salvador, where female and almost fully grown

juvenile were flushed from a nest c. 7 m above ground in early May. One nest in Oaxaca was c. 2 m above ground on a horizontal tree limb surrounded by much bamboo (*Chusquea longifolia*); it consisted of many small twigs and sticks resting on a substantial platform of dead leaves, and was more elaborately constructed than most dove nests. Two nests in Oaxaca contained 1 and 2 eggs; eggs creamy buff.

Movements. Resident.

Status and Conservation. Not globally threatened. Remains common to fairly common in Mexico, though very patchily distributed; generally uncommon in El Salvador. Probably declining in many parts of range due to deforestation.

Bibliography. Anon. (1983), Binford (1989), Bjelland & Ray (1977), Dickey & van Rossem (1938), Hellmayr & Conover (1942), Hernández-Baños *et al.* (1995), Howell & Webb (1995a), Land (1970), Monroe (1968), Ridgway (1916), Rowley (1966, 1984), Stotz *et al.* (1996), Thurber *et al.* (1987).

154. Lined Quail-dove

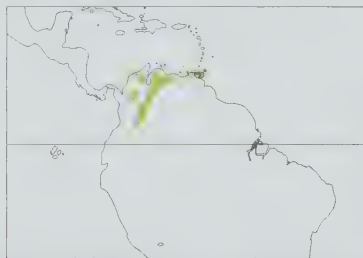
Geotrygon linearis

French: Colombe bridée **German:** Streifentaube **Spanish:** Paloma-perdiz Embridada
Other common names: White-faced Quail-dove

Taxonomy. *Columbi-Gallina linearis* Prévost, 1843, Bogotá, Colombia.

Like most of congeners, formerly placed in genus *Oreopeleia*. Sometimes considered conspecific with *G. albifacies*, and the two may form a superspecies. Birds from NE Venezuela, Trinidad and Tobago have sometimes been placed in race *trinitatis*; those of Santa Marta Mts in race *infusca*. Monotypic.

Distribution. C & NE Colombia (Cauca Valley, Santa Marta, Santa Elena, C & E Andes) to W & N Venezuela (Mérida, Cerro de Ávila, Cumbre de Valencia, Paria Peninsula), and Trinidad and Tobago.



Descriptive notes. 27-29 cm; 230-284 g. Forehead pinkish buff becoming purplish brown on crown; band of pale grey extends from behind eye down onto nape; face buffy white to very pale brown with a dark stripe from bill to and past eye and a second malar stripe extending beyond the ear-coverts; reddish brown above, reddish purple on mantle; dark brown primaries, the outermost ones with buffy fringes; iridescent purple or bronze-green on hindneck; distinctive furrows on sides of neck similar to *G. albifacies*; breast pale grey to brownish grey with purple sides; belly, flanks and undertail-coverts buffy fawn; iris orange, orange-red, brownish orange or yellow; eye-ring red, surrounded by blue; bill black; legs and feet red. Female

similar to male but with brownish tinge on grey breast. Juvenile redder throughout, with most plumage barred brown and blackish.

Habitat. Tropical lowland and montane evergreen forests to 2500 m.

Food and Feeding. Feeds on seeds. Singly or in pairs on the ground in forest.

Breeding. In Colombia, 7 breeding condition birds taken in Apr-Oct; on Trinidad, nest with eggs in Feb. Nest was deep cup of small twigs lined with dead leaves 3-7 m above ground on a horizontal tree fork. Clutch 2 cream-coloured eggs.

Movements. Unknown.

Status and Conservation. Not globally threatened. Poorly known, but apparently remains fairly common in parts of Colombia, e.g. on N slope of the Santa Marta Mts. Threatened by deforestation in some areas. Extensive research required.

Bibliography. Dunning (1982), French (1980), Fjeldså & Krabbe (1990), Hellmayr & Conover (1942), Herklots (1961), Hilty & Brown (1986), Meyer de Schauensee (1982), Meyer de Schauensee & Phelps (1978), Stotz *et al.* (1996).

155. White-throated Quail-dove

Geotrygon frenata

French: Colombe à gorge blanche **German:** Zügeltaube **Spanish:** Paloma-perdiz Gorgiblanca
Other common names: Alamor/Bourcier's/Peruvian/Pink-faced Quail-dove

Taxonomy. *Columba frenata* Tschudi, 1843, Peru.

Like most of congeners, formerly placed in genus *Oreopeleia*. Closely related to *G. linearis*. Races *bourcierii* and *erythropareia* have been considered separate species, and in past whole species erroneously labelled as "*G. bourcierii*". However, differences probably exaggerated, and *erythropareia* may be merely a dark morph; indeed, subdivision into races may be altogether invalid, and species better considered monotypic. Four subspecies tentatively recognized.

Subspecies and Distribution.

G. f. bourcierii Bonaparte, 1855 - W Colombia and W Ecuador.

G. f. erythropareia Salvadori, 1893 - E Ecuador.

G. f. frenata (Tschudi, 1843) - N Peru to C Bolivia.

G. f. margaritae Blake *et al.*, 1961 - S Bolivia to NW Argentina.

Descriptive notes. 30-34 cm; 311 g. Very similar in appearance to *G. linearis* but with forehead and area under eye buff, crown blue grey; slightly darker than *G. linearis* throughout, notably on mantle, which is deep purple. Female less grey than male. Juvenile coarsely barred tawny and fuscous on upperparts and underparts. Races differ mainly in coloration of head.



Habitat. Montane evergreen forest at 900–3000 m, occasionally down to 700 m. Found in humid forest with undergrowth, as well as tall second growth on steep slopes in Andean valleys.

Food and Feeding. No specific information on diet. Feeds on the ground, usually alone but occasionally 2–3 birds together.

Breeding. Little information. Apparently nests Jan–Jul in W Andes of Colombia; late Sept in Urubamba Valley, Peru. One nest was flat platform, 2 m up in a thick tangle; contained 1 pale buff egg.

Movements. Presumed to be resident, but no

precise information. Readily flushes to low branches.

Status and Conservation. Not globally threatened. Very little known, but species reported to be uncommon in Colombia; regularly seen but not common at Calilegua National Park (NW Argentina). Appears to be rather patchily distributed. Extensive research required in order to establish basic details of biology and ecology, as well as surveys to define limits of range and population size and trends; internal taxonomy also needs clarification.

Bibliography. Babarskas *et al.* (1995), Butler (1979), Canevari *et al.* (1991), Chapman (1921), Cook (1996), Fjeldså & Krabbe (1990), Hellmayr & Conover (1942), Hilty (1985), Hilty & Brown (1986), Kirwan & Marlow (1996), Miller (1963), de la Peña (1988), Stotz *et al.* (1996).

156. Key West Quail-dove

Geotrygon chrysis

French: Colombe à joues blanches **German:** Bahamataube **Spanish:** Paloma-perdiz Barbiqueja

Taxonomy. *Geotrygon chrysis* Bonaparte, 1855, Florida.

Like most of congeners, formerly placed in genus *Oreopeleia*. Forms a superspecies with *G. mystacea*. Monotypic.

Distribution. Bahamas (S to San Salvador and N Caicos) through Cuba and I of Pines to Hispaniola and Puerto Rico. Formerly also Florida Keys, where now merely vagrant.



Descriptive notes. Male 27–31 cm, female 27–30 cm; 148–199 g. Chestnut brown above, with bronze green or amethyst iridescence on crown, nape and hindneck; mantle, back, rump and inner wing-coverts with purple or purplish red iridescence; inner secondaries and tips of primaries dusky olive brown; throat white, deep brown malar stripe below broad white facial stripe from bill to and beyond eye to nape; sides of neck and breast mauvish pink or pinkish grey becoming white on belly and dusky brown on flanks; iris red, orange or yellow; orbital skin red; bill dull red at base, brownish at tip; legs and feet red or pinkish.

Female similar, malar stripe duller; wing-coverts, rear scapulars and edges of rectrices greyish brown; darker below, notably on breast. Juvenile very different from adult: above rufous cinnamon; cinnamon buff tips on feathers of scapulars, intercapulars and wing-coverts; head and neck duller than adult, with light tipped feathers; breast and foreneck drab, edged cinnamon.

Habitat. Semi-arid woodland, lowland scrub and wet montane forests with undisturbed understorey up to at least 500 m, locally to over 1000 m in Dominican Republic. Found in scrubby second growth on I of Pines and regularly near habitation in Bahamas. May be ecological replacement of *Leptotilia jamaicensis*, as the two are found in similar habitats but on different islands.

Food and Feeding. Feeds on seeds, berries and fallen fruit; also known to take snails; eats fruit of poisonwood. In Puerto Rico, feeds on fallen fruit of cupey (*Clusea rosea*). Forages on the ground.

Breeding. Generally Feb–Aug; song heard from Jan to early Sept in Bahamas. One nest consisted of light, dry twigs and was reminiscent of nest of *Zenaidura macroura*; nest placed in undergrowth vegetation, sometimes on the ground; one ground nest constructed entirely of loosely arranged leaves. Clutch consists of 2 buff eggs.

Movements. Little known, but species is vagrant to Florida nowadays. Takes flight silently.

Status and Conservation. Not globally threatened. Uncommon in S Bahamas and local on Puerto Rico, though not uncommon at Susua State Forest. Local in Dominican Republic, but not uncommon at Parque Nacional del Este. Formerly described as common in arid areas of Haiti, where it was numerous on Tortue I and Gonave I; local people trapped large numbers on the latter island, using corn or water as bait. Extirpated as a breeding bird in Florida.

Bibliography. Anon. (1983), Barbour (1923, 1943), Biaggi (1983), Bond (1985), Brudenell-Bruce (1975), Buden (1987), Dod (1987), Emlen (1977), Faaborg (1980), Garrido (1986), Hellmayr & Conover (1942), Lack (1976), McNicholl *et al.* (1993), Naether (1974), Pacheco & Ricart (1974), Pérez-Rivera (1989a), Raffaele (1989), Ridgway (1916), Rivera-Milán (1992, 1996), Robertson (1978b), Rodríguez & Sánchez (1993), Rutgers & Norris (1970), Sorrie (1979), Stotz *et al.* (1996), Sulley & Sulley (1992), Terres (1982), Valdés (1984), Wetmore & Swales (1931).

157. Bridled Quail-dove

Geotrygon mystacea

French: Colombe à croissants **German:** Schnurrbarttaube **Spanish:** Paloma-perdiz de Martinica

Taxonomy. *Columba mystacea* Temminck, 1811, Caribbean.

Like most of congeners, formerly placed in genus *Oreopeleia*. Forms a superspecies with *G. chrysis*. Monotypic.

Distribution. Puerto Rico and Virgin Is through most of Lesser Antilles from Saba and Barbuda S to St Lucia (absent from Anguilla, St Martin, Barbados, St Vincent, Grenadines and Grenada).

Descriptive notes. Male 24–30 cm, female 27–5 cm; 230 g. Similar to *G. chrysis* in appearance but duller and darker, with dark olive brown upperparts, and chestnut primaries and outer tail feathers; nape, hindneck and upper mantle suffused with purple iridescence; rufous confined to primaries, outer margin of wings and undertail-coverts; underparts buffy brown; bill tip pale. Female sometimes indistinguishable from male, but may be duller.

Habitat. Lowland woodland and rain forest up to 700 m; appears to prefer drier localities than *G. montana*.



Food and Feeding. Feeds on seeds and snails. Forages on the ground.

Breeding. Peak breeding in May–Jul, with lesser peak in Oct–Dec. Nest placed low in undergrowth; several flimsy nests of twigs with a few leaves may be constructed before a final nest-site is selected. Clutch 1–2 buff-coloured or pale cream-coloured eggs.

Movements. Mainly resident; vagrants have been recorded on Culebra (off E Puerto Rico).

Status and Conservation. Not globally threatened. Currently considered near-threatened. Rare and local resident in Puerto Rico, notably in Vieques Naval Reserve and hills S of Arecibo.

Possibly extirpated from St Croix, due to the devastation caused by Hurricane Hugo in 1989. Scarce on St Lucia, and probably declining, due to predation by introduced mongooses; only three records since 1930's. Surveys required in order to establish local population trends; research required.

Bibliography. Anon. (1983, 1988), Biaggi (1983), Bond (1985), Chipley (1991), Hellmayr & Conover (1942), Keith (1997), Raffaele (1989), Seaman (1966), Stotz *et al.* (1996), Voous (1983), Wauer (1996).

158. Violaceous Quail-dove

Geotrygon violacea

French: Colombe à nuque violette **German:** Bischofsstaube **Spanish:** Paloma-perdiz Violácea
Other common names: Violet Quail Dove, White-bellied Quail Dove

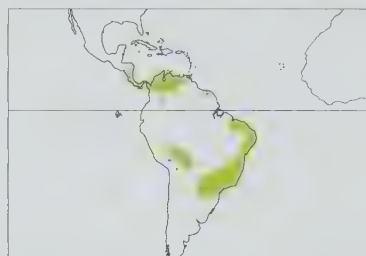
Taxonomy. *Columba violacea* Temminck, 1810, probably Surinam.

Like most of congeners, formerly placed in genus *Oreopeleia*. Possibly related to *G. chrysis* and *G. mystacea*, both of which it resembles in coloration. Two subspecies recognized.

Subspecies and Distribution.

G. v. albiventer Lawrence, 1865 - Nicaragua, Costa Rica and Panama through NE Colombia (Santa Marta region) to W, N & SC Venezuela.

G. v. violacea (Temminck, 1810) - Surinam, through E Brazil S of Amazon (E Pará, Alagoas and Bahia through Espírito Santo, Rio de Janeiro and Minas Gerais to São Paulo and Paraná) to N & E Bolivia (Pando, La Paz, Beni, Santa Cruz), Paraguay and extreme NE Argentina (Misiones).



Descriptive notes. Male 21–23.5 cm, female 21–24.5 cm; 93–150 g. Forehead and face greyish white becoming greyish mauve on crown, then iridescent purple or amethyst on hindneck and mantle; rest of upperparts brown suffused with purple iridescence, absent from primaries, outer secondaries and outer wing-coverts; throat and breast white tinged purple; pale malar stripe running to below the eye; flanks buff, belly and undertail-coverts white; underwing mottled white, black and chestnut; iris orange-brown or yellow-brown; bill and cere carmine; feet and legs coral red. Female duller; purple gloss only on hindneck and upper back; face and throat pale grey; neck and breast brownish with purple tinting; iris brown.

Juvenile, similar to female, but darker, lacking iridescence and feathers scalloped cinnamon and dull rufous. Race *albiventer* bluer on head, breast and mantle.

Habitat. Frequents heavily shaded undergrowth in tropical lowland evergreen forest, secondary forest and cacao plantations up to 1650 m. More arboreal than congeners, frequently seen perching in upper part of understorey.

Food and Feeding. Seeds and fallen fruits and probably small invertebrates. Forages on the ground.

Breeding. In Colombia, four breeding condition birds taken in Mar–Jun, and a juvenile in Jul, with a barred juvenile taken in late Sept; in Panama, nest with eggs found in Jul; in Paraguay, adults with enlarged gonads in Nov. Stick nest located 2–3 m above ground. One nest contained 2 buff-coloured eggs.

Movements. Seasonal movements and even distribution poorly known. Flight silent.

Status and Conservation. Not globally threatened. Local and scarce in Caribbean lowlands and foothills of Costa Rica and Nicoya Peninsula; more numerous in moist forest along Pacific slope of the Cordillera de Guanacaste. Seemingly scarce in Panama, where there have been few records. Considered rare or very uncommon in Colombia.

Bibliography. Brooks *et al.* (1993), Canevari *et al.* (1991), Guix (1995), Haverschmidt & Mees (1994), Hellmayr & Conover (1942), Hilty & Brown (1986), Madroño *et al.* (1997), Meyer de Schauensee (1966), Meyer de Schauensee & Phelps (1978), Navas & Bó (1988), de la Peña (1988), Pinto (1949), Ridgely & Gwynne (1989), Schubart *et al.* (1965), Sick (1985, 1993), Slud (1964), Stiles & Skutch (1989), Stotz *et al.* (1996), Teixeira *et al.* (1993), Wetmore (1968), Willis & Eisenmann (1979).

159. Ruddy Quail-dove

Geotrygon montana

French: Colombe rouviolette **German:** Bergtaube **Spanish:** Paloma-perdiz Común
Other common names: Partridge/Red Mountain Dove, Rufous Quail-dove

Taxonomy. *Columba montana* Linnaeus, 1758, Jamaica.

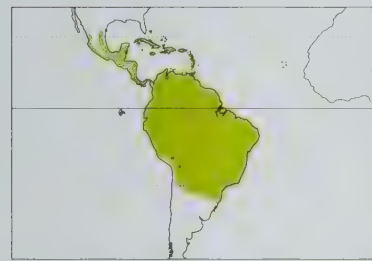
Like most of congeners, formerly placed in genus *Oreopeleia*. A very distinctly marked member of the genus; perhaps closely related to *G. chrysis*, *G. mystacea* and *G. violacea*. Race *martinica* has been considered a separate species. Two subspecies recognized.

Subspecies and Distribution.

G. m. montana (Linnaeus, 1758) - Mexico (from S Sinaloa and Veracruz) S through Central America and Greater Antilles (Cuba and I of Pines, Jamaica, Hispaniola, Puerto Rico, perhaps St Tomas) to Colombia, Venezuela and the Guianas, and S to Peru, Bolivia, Paraguay, C & S Brazil (W Mato Grosso, Rio Grande do Sul) and extreme NE Argentina (Misiones).

G. m. martinica (Linnaeus, 1766) - Lesser Antilles (Guadeloupe, Dominica, Martinique, St Lucia). Populations from Grenada and Trinidad appear intermediate between the two races.

Descriptive notes. Male 21–28 cm, 85–150 g; female 19–26 cm, 99–152 g. Rich chestnut upperparts suffused with purple red iridescence on nape, back, sides of neck, mantle, inner wing-coverts and rump; face below eye fawn bordered by two purplish chestnut stripes, one from nape through eye



and the second down onto malar region; breast purple-pink, becoming buff on belly, flanks and undertail-coverts; buff patch on breast sides visible as streak on edge of folded wing; bill red at base, usually black distally but rarely with pink tip; iris yellow, amber or orange-brown; orbital skin rose or purplish red, legs and feet purplish red. Female mostly olive brown where male is chestnut, with greenish sheen; buff of male suffused dusky olive in female; bare parts paler than male. Juvenile paler throughout than adult with chestnut or buffy tips to interscapulars, scapulars and proximal secondaries; uppertail-coverts and rectrices

tipped cinnamon-rufous. Race *martinica* larger and darker.

Habitat. Lowland humid evergreen or semi-deciduous forests; also second growth, light woodland and coffee plantations; ranges as high as 1500 m in Mexico, 1400 m in Panama, and 2600 m in Colombia.

Food and Feeding. Takes seeds (e.g. of *Borreria* and *Styrax*) and fruits, but small invertebrates are also an important part of diet; sometimes visits manakin (*Pipra*) leks to feed on regurgitated seeds. Forages almost exclusively within forest or woodland on the ground; occurs singly or in pairs.

Breeding. In Costa Rica, Mar-Aug, with peak in May when *Leptotila* and *Claravis* are not breeding; nests on Trinidad Feb-Jul; in French Guiana, Feb-Apr; in Colombia, Jan-Jun; in Caribbean, Feb-Aug; in S Venezuela, adults with enlarged gonads in Feb and Apr; in Peru, breeding in Urubamba Valley in late Aug. In Costa Rica, stick nest on platform of dead leaves and petioles, 0.6-3 m (mean 1.1 m) up in bush, tree, *Polypodium* fern and the epiphyte *Tillandsia*; nest found in a low tree-fern on St Lucia; on Trinidad and in French Guiana, nest is of twigs lined with fresh leaves. Adults will occasionally give a distraction display when leaving the nest. Usually 2 eggs, sometimes 1, buff, creamy or sand-coloured; incubation 10-11 days, by both adults; fledging 10 days, an unusually short nestling period for a dove of its size; young initially fed regularly and often, but, after first week, only c. 3 times per day. Nest sanitation practised by parents, which eat nestling faecal matter.

Movements. Nomadic or perhaps migratory. In one study in Brazil, birds were never recaptured in different years, suggesting nomadic movements. Species has often been recorded at sea in Caribbean, although it is apparently resident on many islands; a male was trapped on Soldado Rock, off Trinidad, in Oct. Tobago records require substantiation.

Status and Conservation. Not globally threatened. May be suffering local extinctions due to clearing of forests, e.g. in Sierra Madre del Sur, Oaxaca (S Mexico). Known to decrease in abundance in forest patches of less than 1 ha, indicating that it is highly sensitive to fragmentation of forest. Fairly common throughout much of Central and South America, where is typically the commonest quail-dove in most suitable areas, and is occasionally described as numerous, e.g. in Santa Marta Mts of NE Colombia. Uncommon due to lack of suitable habitat in Haiti. Formerly more common and widespread in Dominican Republic, where large numbers were trapped for the pet trade; birds hunted at night with torches, when they could be captured by hand as they roosted, or in the day using small traps constructed of sticks. Very rare in Virgin Is; generally uncommon, due to hunting and mongoose predation, in Lesser Antilles, e.g. on St Lucia; not uncommon on Trinidad.

Bibliography. Barbour (1923, 1943), Belton (1984), Biaggi (1983), Binford (1989), Bond (1985), Canevari *et al.* (1991), Chapman (1921), Chebez (1992), Cruz (1974), Davis *et al.* (1985), French (1980), Fjeldså & Krabbe (1990), Haverschmidt & Mees (1994), Hellmayr & Conover (1942), Herklots (1961), Hilty & Brown (1986), Howell & Webb (1995a), Keith (1997), Land (1970), Lill (1969), Meyer de Schauensee & Phelps (1978), Monroe (1968), Olson & Angle (1977), Pacheco & Whitney (1995), de la Peña (1988), Pérez-Rivera (1979), Raffaele (1989), Ridgely & Gwynne (1989), Ridgway (1916), Rivera-Milán (1992, 1996), Robertson & Given (1980), Rodríguez & Sánchez (1993), Rodríguez *et al.* (1989), do Rosário (1996), Rowley (1966), Rutgers & Norris (1970), Schubart *et al.* (1965), Sick (1985, 1993), Skutch (1949, 1964, 1981), Slud (1964, 1980), Snyder (1966), Stiles & Skutch (1989), Stotz *et al.* (1996), Stouffer & Bierregard (1993), Thurber *et al.* (1987), Tostain *et al.* (1992), Wetmore (1957, 1968), Wetmore & Swales (1931), Willard *et al.* (1991).

Genus *STARNOENAS* Bonaparte, 1838

160. Blue-headed Quail-dove

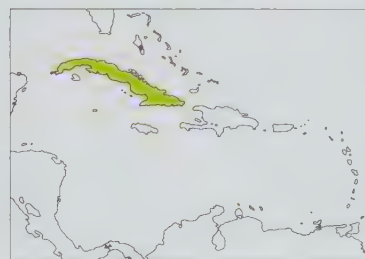
Starnoenas cyanocephala

French: Colombe à tête bleue **German:** Kubataube **Spanish:** Paloma-perdiz Cubana
Other common names: Blue-headed Ground-pigeon, Black-bearded Dove

Taxonomy. *Columba cyanocephala* Linnaeus, 1758, Jamaica (?).

Probably related to *Geotrygon*, and sometimes included within that genus. Monotypic.

Distribution. Cuba; formerly also I of Pines. Also recorded in S Florida in past, but probably only as vagrant. Repeatedly introduced to Jamaica in the past, but never established there.



Descriptive notes. Male 29-34.5 cm, female 29-34 cm; 242 g. Forehead and crown bright blue bordered by black line from rictus to and behind eye, and joining on nape; white stripe below this; face and throat black extending to form a black bib edged with white; pinkish purple breast becoming olive-brown, tinged purple on sides and back of neck and mantle; belly and rest of plumage buffy brown to dark brown, darkest on primaries; outer tail feathers slate-grey; bill red basally, light blue terminally; tarsus deep red, legs and feet pinkish. Sexes alike. Juvenile duller than adult, back and wing feathers narrowly edged rufous.

Habitat. Mainly in undergrowth of lowland forest including wet swamps, occasionally in highlands; apparently requires areas with thick overhead cover but an open forest floor, preferably with stony substrate and substantial leaf litter. Favours drier areas than those used by *Geotrygon caniceps*, with which it occurs sympatrically.

Food and Feeding. Takes seeds, berries and snails; also invades pea plantations. Mostly terrestrial, usually in pairs.

Breeding. Mainly Apr-Jul. Simple nest built in low shrubbery or on the ground, sheltered by bushes or among tree-roots; also recorded building in *Tillandsia* epiphytes. Clutch 1-2 white eggs.

Movements. No recent evidence of any movements, and assumed to be essentially resident. Reported from Florida Keys in first half of 19th century, and may have occurred there accidentally. Prefers to run, rather than fly, from perceived danger.

Status and Conservation. **ENDANGERED.** Extirpated from I of Pines, where formerly occurred in Caballo Mts, although always rare. Formerly common and widespread on mainland Cuba; significant declines due to excessive poaching and habitat destruction were already evident in mid-19th century, and were the widespread trend by early 1920's. Species now rare and generally localized in distribution; in 1980's and 1990's, only appeared to occur in significant numbers in forested areas between Soplillar and Cayo Ramona, in vicinity of Zapata Swamp; in lesser numbers on Guanahacabibes Peninsula and at Pinares de La Güira, San Diego. Species is much appreciated for eating; this and other species of quail-dove trapped using pyramidal wooden cage baited with an orange seed or by calling birds to a decoy and then netting them.

Bibliography. Allen (1961), Anon. (1983), Barbour (1923, 1943), Bent (1932), Biaggi (1983), Bond (1956, 1985), Collar & Andrew (1988), Collar, Crosby & Stattersfield (1994), Collar, Gonzaga *et al.* (1992), Garrido (1986), Garrido & García (1975), Garrido *et al.* (1986), Gotto (1997), Hellmayr & Conover (1942), Mitchell & Wells (1997), Pérez-Rivera (1989a), Ripley & Watson (1956), Rodríguez & Sánchez (1993), Rutgers & Norris (1970), Stotz *et al.* (1996), Sulley & Sulley (1992), Valdés (1984), Wege & Long (1995).



Genus *CALOENAS* G. R. Gray, 1840

161. Nicobar Pigeon

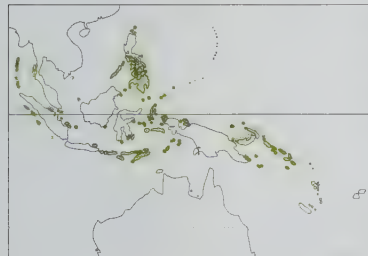
Caloenas nicobarica

French: Nicobar à camail **German:** Kragentaube **Spanish:** Paloma de Nicobar
Other common names: Hackled/White-tailed/Vulturine Pigeon

Taxonomy. *Columba nicobarica* Linnaeus, 1758, Nicobar Islands. Distinctive genus of uncertain affinities, perhaps closest to *Gallicolumba*, with which it may share a common ancestral stock. Larger extinct form, *C. canacorum*, known from New Caledonia and Tonga. Two subspecies recognized.

Subspecies and Distribution.

C. n. nicobarica (Linnaeus, 1758) - Andaman and Nicobar Is, Mergui Archipelago and Con Son Is (off S Vietnam) through Indonesia and Philippines to islands off New Guinea and Solomon Is.
C. n. pelewensis Finsch, 1875 - Palau Is.



Descriptive notes. 32-35 cm; male 460-525 g, female 490-600 g. Stocky and dark, with unique long fowl-like hackles on the neck and a very short all white tail; head and hairy upper neck feathers dark blackish grey with a silvery purple bloom; upperparts glossy dark or coppery green; underparts dark, iridescent green or green and blue; heavy black bill with enlarged cere; feet purplish red with yellow or buffy claws. Female similar, but has smaller cere, shorter hackles and browner underparts. Immature lacks neck hackles and is entirely brownish black, including the tail; hackles acquired before the white tail by maturing birds.

Race *pelewensis* marginally smaller and bluer, with shorter neck hackles.

Habitat. Occurs only on small wooded islands, typically off larger landmasses; found in mangroves, bushes, lowland and foothill forests up to at least 700 m. In places, persists in secondary habitats and will tolerate selectively logged forest.

Food and Feeding. Feeds on fallen fruits and seeds; thick-walled muscular gizzard is lined with horny plates, capable of grinding large nuts. Feeds on the ground, usually singly or in pairs; particularly active at dawn and dusk, and (on basis of observations of captive birds) may be crepuscular.

Breeding. Season apparently prolonged; on Tench I (Bismarck Archipelago), pairs gather to nest in Jun, with some birds remaining on nests until Jan; Jan-Mar/Apr in Andamans and Nicobars; males in breeding condition on Sumbawa in May; egg collected mid-Mar on Saya I in Lingga Archipelago (off E Sumatra); immature collected on Palawan (SW Philippines) in Nov; Oct-Mar on small islands off Irian Jaya. Nests in colonies, usually on small islands; undisturbed colonies may number 1000's of pairs. Nest is untidy platform of twigs; can be placed as low as 2 m above ground in undisturbed colonies, or just below the canopy (up to 12 m) in disturbed sites; several nests may be placed in a single tree. Lays 1 white egg; hatchling reported to be devoid of down; fledging takes up to 1 month.

Movements. Highly nomadic. Commutes between islands, visiting larger islets to feed, and then sometimes even reaching "mainland" islands, e.g. New Guinea. Locally common when and where trees are fruiting, subsequently absent. Often in flocks of up to 85 birds, typically flying at a height of 60 m or more; flight profile distinctive, with long neck, broad wings, and very short tail; when flushed from ground, bird flies up with a whirr of wings to land in middle or upper level of forest.

Status and Conservation. Not globally threatened. CITES I. Currently considered near-threatened. Formerly classed as a threatened species. Colonial nesting habits make species vulnerable to disturbance, as the small isolated islands it prefers become increasingly developed. Population information scarce, but species is known to have declined markedly in much of its range, e.g. now probably rare on Bornean offshore islands. There are comparatively few recent records from Indonesia, from Halmahera, Bacan, coastal Obi, Sumbawa, Flores, Sula Is, submontane forest on Seram, and several small island colonies off Irian Jaya, where species is apparently highly susceptible to disturbance. Severe hunting pressure reported around New Guinea, where 86 skulls, mostly of this species, but also of *Ducula bicolor*, were found at a "dump" on Palau Kumbur, Irian Jaya; also in Solomon Is. Habitat destruction, hunting and trade are all major problems in Philippines, where principally known from small islands; no recent records from Negros; already scarce on Siquijor in early 1950's, and perhaps now extirpated from W Visayas. Remains locally common on some smaller offshore islands off Sumatra, but considered to be rare through much of Greater Sundas. Race *pelewensis* is primarily found on the small "rock islands" S of Koror, and is considered vulnerable by the US Fish and Wildlife Service, although the population is apparently stable at present.

Bibliography. Ali & Ripley (1981), Baker (1951), Balouet & Olson (1989), Beehler *et al.* (1986), Bell (1981), Brooks *et al.* (1992), Butchart *et al.* (1996), Cain & Galbraith (1956), Coates (1985), Coates & Bishop (1997), Collar & Andrew (1988), Davidson *et al.* (1995), Dickinson *et al.* (1991), Engbring (1992), Erritzoe (1993), Evans, Dutton & Brooks (1993), Hadden (1981), Hay (1986), Heinroth (1902), Holmes & van Balen (1996), Hoogerwerf (1967, 1969), King (1978/79), Lambert (1993b), Lekagul & Round (1991), MacKinnon (1988), MacKinnon & Philipps (1993), van Marle & Voous (1988), Medway & Wells (1976), Mitchell (1989), Nicolai (1969), Oehler (1990), Pratt, Bruner & Berrett (1987), Pratt, Engbring *et al.* (1980), Rand & Rabor (1960), Ripley (1982), Round (1988), Rutgers & Norris (1970), Smythies (1981, 1986), Steadman (1989b), Tikader (1984), Webb (1997), Wells (1985), White & Bruce (1986).

Genus *GALLICOLUMBA* Heck, 1849

162. Luzon Bleeding-heart

Gallicolumba luzonica

French: Gallicolombe poignardée **German:** Dolchstichtaube **Spanish:** Paloma Apuñalada de Luzón

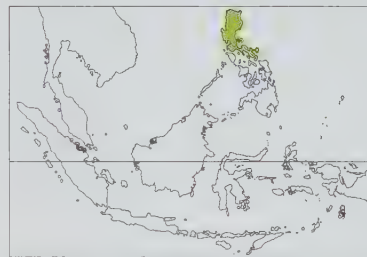
Other common names: Luzon Blood-breasted/Bleeding-heart Pigeon

Taxonomy. *Columba Luzonica* Scopoli, 1786, Luzon, Philippines.

A member of the bleeding-heart superspecies, with *G. criniger*, *G. platenae*, *G. keayi* and *G. menagei*, which are sometimes isolated in a subgenus *Gallicolumba* along with *G. rufigula*; all of the bleeding-hearts have been considered conspecific by some authorities. Three subspecies recognized.

Subspecies and Distribution.

G. l. griseolateralis Parkes, 1962 - N Luzon (N Philippines).
G. l. luzonica (Scopoli, 1786) - C & S Luzon and Polillo (N Philippines).
G. l. rubiventris Gonzales, 1983 - Vigo-Gigmoto watershed on Catanduanes (NE Philippines).



Descriptive notes. 30 cm; 184 g. All bleeding-hearts are remarkable for their breast markings, which appear like a deep, still-bleeding wound, an illusion most perfect in *G. luzonica*. A plump, short-tailed and long-legged bird. Forehead and wing-coverts light blue-grey, latter marked with three dark reddish brown bands across closed wing; crown, nape, sides of breast, mantle, back and rump dark grey with broad iridescent fringes giving overall appearance of violet-purple or bronzy green, depending on light; primaries, secondaries and central tail feathers dull dark brown; underwing chestnut; outer tail feathers blue-grey with blackish subterminal bands; throat, breast and underparts white, tinged pale pink below breast patch and more deeply pinkish-red adjacent to it, giving appearance of blood fading as it spread; longitudinal patch of blood-red feathers with loose, hairy texture in centre of breast; these feathers usually form a groove or indentation, enhancing the wound illusion; iris blue; orbital skin grey; bill blackish, grey at base; legs and feet red. Sexes alike, but female has iris purple or greyish purple. Juvenile presumably resembles that of *G. criniger*. Races differ slightly, in coloration of underparts.

Habitat. Primary and secondary forest, from sea-level up to at least 1400 m.

Food and Feeding. Feeds on seeds, fallen berries, and insects, worms and other invertebrates on the forest floor.

Breeding. Little information from the wild. A nest with young was reported from Luzon in May. A pair in captivity incorporated green vegetation, especially large leaves, into their nest. In captivity: clutch 2 eggs; incubation 17 days; young first flew at 12 days, although their tail feathers were barely showing.

Movements. Presumably sedentary. When flushed, flies only a short distance, and then flees on foot.

Status and Conservation. Not globally threatened. CITES I. Currently considered near-threatened. Generally shy and uncommon. In 1991 and 1992, surveys revealed species to be common at Digollorin, but uncommon at Palanan, Dimalayag, Los Dos Cuernos, Minuma, Siagot and Mt Cetaceo, being recorded in all forest types, except mossy forest, between sea-level and 1400 m. Commonly trapped by local people for meat and for the pet trade. In Dec 1991, total of 16 birds seen to be offered for sale in a market in Manila. Not uncommon in zoos and collections.

Bibliography. Alonzo-Pasicolan (1992), Danielsen *et al.* (1994), Delacour (1964), Delacour & Mayr (1946), Dickinson *et al.* (1991), Diesmos & Pedragosa (1995), DuPont (1971), Erritzoe (1993), Gonzales (1983), Gonzales & Rees (1988), Goodman & Gonzales (1990), Hachisuka (1931a), McGregor (1909-1910), Nicolai (1969), Poulsen (1995), Rand & Rabor (1960), Roles (1993), Rutgers & Norris (1970).

163. Mindanao Bleeding-heart

Gallicolumba criniger

French: Gallicolombe de Bartlett **Spanish:** Paloma Apuñalada de Mindanao
German: Brandtaube

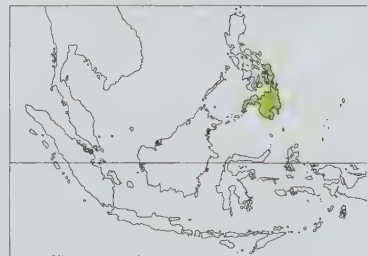
Other common names: Bartlett's (Blood-breasted) Pigeon/Bleeding-heart, Hair-breasted Pigeon, Hair-breasted Bleeding-heart

Taxonomy. *Pampusana criniger* Pucheran, 1853, Sulu Islands; error = Mindanao.

A member of the bleeding-heart superspecies, with *G. luzonica*, *G. platenae*, *G. keayi* and *G. menagei*, which are sometimes isolated in a subgenus *Gallicolumba* along with *G. rufigula*; all of the bleeding-hearts have been considered conspecific by some authorities. Proposed race *basilanica* is a synonym of *bartletti*. Three subspecies recognized.

Subspecies and Distribution.

G. c. leytensis (Hartert, 1918) - Samar, Leyte and Bohol (CE Philippines).
G. c. criniger (Pucheran, 1853) - Mindanao and Dinagat (SE Philippines).
G. c. bartletti (P. L. Sclater, 1863) - Basilan (SE Philippines).



Descriptive notes. 30 cm; 181-204 g. General appearance similar to *G. luzonica*, except as follows: iridescence on head, neck and mantle predominantly bronzy green rather than purple in most lights; forehead darker grey; back, inner wing-coverts, secondaries and central tail feathers chestnut; breast patch larger and consists of uniform dark red, rough and hairy feathers; lower breast deep reddish buff becoming creamy-buff on belly; iris blue; bill blackish; feet red. Sexes alike but female has purplish iris. Juvenile predominantly reddish brown with no blue-grey in plumage; wing-coverts barred buff and dark brown, not blue-grey and

chestnut, as adult; bill of nestling horn with white tip. Race *leytensis* has different breast pattern; *bartletti* has pectoral spot paler than in nominate.

Habitat. Primary and secondary forest, at 100-600 m on Samar.

Food and Feeding. No information available on diet, but presumably similar to that of *G. luzonica*. Feeds on the forest floor.

Breeding. Display was observed on Bohol in early May; on Samar, birds with enlarged gonads taken in Apr-May. A nest found in Samar in mid-May was located 1.3 m up and composed of a loose platform of sticks and bamboo lined with bamboo leaves. It contained 1 freshly-laid, cream-coloured egg. A pair in captivity laid a clutch of 1 egg.

Movements. No information. Presumably sedentary.

Status and Conservation. **VULNERABLE.** Several of the islands within the species' range have not been surveyed recently: there is no recent information from Samar, Leyte, Dinagat or Basilan. However, rarity on Mindanao, where species has been seen by few recent observers, and the general level of habitat loss throughout its range suggest that species is probably in serious decline. Nevertheless, on Bohol, there have been 4 records from Rajah Sikatuna National Park since its discovery there in 1989. Held in several zoos and collections.

Bibliography. Brooks *et al.* (1996), Buck *et al.* (1990), Collar *et al.* (1994), Delacour & Mayr (1946), Dickinson *et al.* (1991), Diesmos & Pedragosa (1995), DuPont (1971), DuPont & Rabor (1973b), McGregor (1909-1910), Newman (1909), Rand & Rabor (1960), Rutgers & Norris (1970).

164. Mindoro Bleeding-heart

Gallicolumba platenae

French: Gallicolombe de Mindoro **German:** Platentaube **Spanish:** Paloma Apuñalada de Mindoro
Other common names: Mindoro Pigeon

Taxonomy. *Phloganas platenae* Salvadori, 1893, Mindoro.

A member of the bleeding-heart superspecies, with *G. luzonica*, *G. criniger*, *G. keayi* and *G. menagei*, which are sometimes isolated in a subgenus *Gallicolumba* along with *G. rufigula*; all of the bleeding-hearts have been considered conspecific by some authorities. Monotypic.

Distribution. Mindoro (CE Philippines).



Descriptive notes. 30 cm. Forehead dark grey, merging into green iridescence on head, nape and hindneck; upperparts rich chestnut, vividly glossed reddish purple on mantle and back; pale grey, dark-spotted feathers near wing bend and pale grey tips to some median wing-coverts; otherwise wings chestnut; uppertail-coverts and tail grey, contrasting with chestnut rump; breast patch much smaller than in other bleeding-hearts, and orange, thus not having bloodstained appearance; white underparts tinged cream on belly and greyish on flanks. Female similar, but iris purple. Juvenile plumage undescribed.

Habitat. Restricted to lowland forest below 400 m, apparently preferring dry forest floors with thick undergrowth on a gentle gradient.

Food and Feeding. No information available; habits presumed to be similar to those of *G. luzonica*.

Breeding. A nest with young was found in May. Nest is a flimsy platform 1-2 m above ground. Lays 2 pale cream-coloured eggs. No further information available.

Movements. No information. Presumably sedentary.

Status and Conservation. **CRITICALLY ENDANGERED.** Already considered localized in 1954, species was last recorded in Dec 1991 from Sablayan (2 birds), the largest remaining tract of lowland forest on Mindoro. There are recent reports by local people from two other areas, San Vicente and Malpalon, and species was reported by villagers as being common in the extreme S of the island in the relatively recent past. All of these areas are vulnerable to forest clearance and the trapping of ground-dwelling animals. Thorough surveys urgently needed, especially in areas where presence of species reported by local people; research also necessary, if any surviving populations are eventually located.

Bibliography. Brooks, Dutson *et al.* (1995), Collar & Andrew (1988), Collar *et al.* (1994), Delacour & Mayr (1946), Dickinson *et al.* (1991), Diesmos & Pedragosa (1995), DuPont (1971), Dutson *et al.* (1992), Evans, Dutson & Brooks (1993), Hachisuka (1932), McGregor (1905, 1909-1910), Oliver & Wirth (1996), Ripley & Rabor (1958).

165. Negros Bleeding-heart

Gallicolumba keayi

French: Gallicolombe de Negros **German:** Negrostaube **Spanish:** Paloma Apuñalada de Negros
Other common names: Keay's Bleeding-heart, Negros (Blood-breasted) Pigeon

Taxonomy. *Phloganas keayi* W. E. Clarke, 1900, Negros.

A member of the bleeding-heart superspecies, with *G. luzonica*, *G. criniger*, *G. platenae* and *G. menagei*, which are sometimes isolated in a subgenus *Gallicolumba* along with *G. rufigula*; all of the bleeding-hearts have been considered conspecific by some authorities. Monotypic.

Distribution. Negros (CE Philippines).



Descriptive notes. 30 cm. Very similar to *G. platenae*, but breast patch blood red and longer (though smaller than in *G. luzonica*); crown, nape, upper mantle, sides of neck and innermost lesser wing-coverts iridescent green; grey colour on wing paler and forms a single greyish white band across folded wing; uppertail-coverts and central tail feathers chestnut like back. Sexes similar. Juvenile plumage undescribed.

Habitat. Historically found in primary and secondary forest, on the forest floor; the only recent records have been from 900-1200 m elevation on Mt Canlaon, in an area experi-

encing severe deforestation.

Food and Feeding. Feeds on the forest floor; no information on diet.

Breeding. No information available.

Movements. No information. Presumably sedentary.

Status and Conservation. **CRITICALLY ENDANGERED.** Single records from Mt Canlaon in 1990 (probable), 1991 and 1994 (in severely degraded forest); previous to these sightings, the species had not been recorded since 1927. Remaining forest in this region is rapidly being cleared

and strong hunting pressure continues, raising grave concern for continued survival of this species. Local people report that species survives, albeit rarely, at two other sites, Mambucal and Patag, at both of which it is occasionally trapped. Unlike *G. luzonica*, present species appears unable to tolerate secondary forest; there are no records from Bab-ban, one of the few areas on Negros where even secondary forest remains.

Bibliography. Brooks *et al.* (1992), Collar & Andrew (1988), Collar *et al.* (1994), Delacour & Mayr (1946), Dickinson *et al.* (1991), Diesmos & Pedragosa (1995), DuPont (1971), Evans, Dutson & Brooks (1993), Lambert (1993b), McGregor (1909-1910), Oliver & Wirth (1996), Robson & Davidson (1996).

166. Sulu Bleeding-heart

Gallicolumba menagei

French: Gallicolombe de Tawi-Tawi

Spanish: Paloma Apuñalada de Tawitawi

German: Tawitawitaube

Other common names: Tawitawi Bleeding-heart

Taxonomy. *Phlogoenas menagei* Bourns and Worcester, 1894, Tawitawi, Philippines.

A member of the bleeding-heart superspecies, with *G. luzonica*, *G. criniger*, *G. platenae* and *G. keayi*, which are sometimes isolated in a subgenus *Gallicolumba* along with *G. rufigula*; all of the bleeding-hearts have been considered conspecific by some authorities. Monotypic.

Distribution. Tawitawi in Sulu Is (S Philippines). An old sight record from Jolo (C Sulu Is) has never been confirmed.



Descriptive notes. 30 cm. Similar in appearance to *G. criniger*, but differs in having breast patch bright orange and belly ashy grey becoming creamy white on vent; iridescent green on neck spreads almost completely across the breast, enclosing the breast patch; iris silvery grey; bill black at base, dark grey at tip. Sexes similar. Juvenile plumage undescribed.

Habitat. Primary and secondary forest.

Food and Feeding. Feeds on the forest floor; no other information.

Breeding. No information available.

Movements. No information. Presumably sedentary.

Status and Conservation. **ENDANGERED.** Restricted to Tawitawi, where the once extensive forests had been almost completely cleared by Aug 1994. No recent records, although the area was visited briefly in Sept 1991, when extensive forests still remained. It also went unrecorded during a 22-day visit to the island in Dec 1971. However, a recent ethnobiological interview-based survey revealed that the species is apparently still relatively common, although in decline, on the islets of Tandubatu, Dundangan and Baliungan, where it is still regularly seen by local people. Threatened by uncontrolled hunting as well as habitat loss. The island of Jolo, whence there is an old, unconfirmed sighting, is now completely devoid of forest. Intensive surveys urgently required, especially of islets where species reported by local people still to be common, in order to establish current status of remaining populations, and plan for successful long-term conservation of the species.

Bibliography. Collar & Andrew (1988), Collar *et al.* (1994), Delacour & Mayr (1946), Dickinson *et al.* (1991), Diesmos & Pedragosa (1995), DuPont (1971), DuPont & Rabor (1973a), Dutson *et al.* (1996), Lambert (1993b), McGregor (1909-1910), Oliver & Wirth (1996).

167. Cinnamon Ground-dove

Gallicolumba rufigula

French: Gallicolombe à poitrine d'or

Spanish: Paloma-perdiz Pechidorada

German: Goldbrusttaube

Other common names: Goldenheart, Red-throated/Rufous Ground-dove, Chestnut/Rufous/Yellow-and-brown Quail-dove

Taxonomy. *Peristera rufigula* Pucheran, 1853, Triton Bay, New Guinea.

Closely related to the bleeding-heart superspecies (*G. luzonica* and allies) and sometimes isolated with them in the subgenus *Gallicolumba*. Five subspecies recognized.

Subspecies and Distribution.

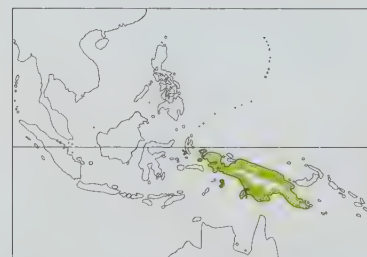
G. r. rufigula (Pucheran, 1853) - W Papuan Is.

G. r. septentrionalis (Rand, 1941) - N New Guinea E to Huon Gulf.

G. r. helviventris (Rosenberg, 1867) - S New Guinea from R Waitakwa E to R Fly; Aru Is.

G. r. alaris (Rand, 1941) - S New Guinea E to Karimui (Chimbu Province).

G. r. orientalis (Rand, 1941) - SE New Guinea, W to R Mambare and R Angabunga.



Descriptive notes. 22-24 cm; 121-137 g. Forehead rufous buff; face pale pinkish buff with band of bluish grey above and behind eye; rest of upperparts and sides of breast vinaceous grey-brown to reddish brown; grey edges to wing-coverts forming series of bars on closed wing; centre of throat, breast and underparts white with central breast golden yellow; underwing-coverts banded blackish and white; central tail feathers purplish chestnut, outer ones grey with broad chestnut and black central bands; iris purplish; bill dark purplish; legs and feet purplish red. Sexes similar, but female slightly paler on breast and forehead. Juvenile

has centre of breast reddish brown and pale rufous edging to wing-coverts. Race *alis* has head markings pinkish brown rather than grey; *helviventris* similar but darker on head, and has grey wing bars suffused purplish and thus less conspicuous; other races show only minor differences in plumages.

Habitat. Primary rain forest and monsoon forest, from sea-level up to 1000 m, occasionally to 1700 m.
Food and Feeding. Diet consists of seeds, fallen fruits and insects. Considered to be more insectivorous than *Chalcophaps indica* and *C. stephani*, with one or other of which is often sympatric. In some areas, numbers may increase dramatically in response to seed-set by wild bamboo. Forages on the ground; usually solitary.

Breeding. Season apparently prolonged, from latter part of dry season through rainy season; nesting records from N New Guinea in Aug, Trans-Fly region in Sept-Oct and Port Moresby area in Feb-Mar. Nest typically consists of a few twigs and leaves arranged on a firm foundation, e.g. palm frond or birds-nest fern; recorded 0.9-2.7 m above ground. Lays 1 egg, white tinged pale cream; nestling covered with distinctive pale cinnamon down; at 1 nest, nestling fully feathered and probably capable of flight by c. 9 days, but still in nest at c. 16 days; adult is very shy near nest, and 1 brooding parent performed a fluttering distraction display when flushed.

Movements. Little known, but species may be partially nomadic, based on population fluctuations in response to bamboo seed-set. Almost entirely terrestrial, except when nesting and roosting in low vegetation; typically seen walking quickly over forest floor, head bobbing rapidly; if flushed, quickly alights and continues to flee on foot.

Status and Conservation. Not globally threatened. Precise data not available, but species appears to be uncommon to fairly common, though often overlooked because of retiring behaviour, e.g. only recently recorded in Yominbip area, despite considerable previous work in this region. Held in several zoos and collections.

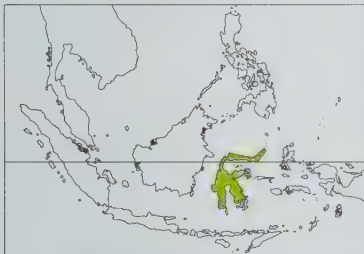
Bibliography. Andrew (1992), Bailey (1992a), Beehler (1978b), Beehler *et al.* (1986), Coates (1985), Diamond (1972a), Gifford (1941), Mayr & Rand (1937), Owen (1985), Peckover & Filewood (1976), Rand (1942a), Rand & Gilliard (1967), Ripley (1964), Rowland (1995).

168. Sulawesi Ground-dove
Gallicolumba tristigmata

French: Gallicolombe tristigmate **German:** Hopftaube **Spanish:** Paloma-perdiz de Célebes
Other common names: Sulawesi Quail-dove

Taxonomy. *Columba tristigmata* Bonaparte, 1855, Tondano, Sulawesi.
A distinctive form of uncertain affinities, considered to be most closely allied to the bleeding-heart superspecies (*G. luzonica* and allies) and to *G. rufigula*; has been placed in its own subgenus, *Diopzeug*, by some authorities. Three subspecies recognized.

Subspecies and Distribution.
G. t. tristigmata (Bonaparte, 1855) - N & NC Sulawesi
G. t. bimaculata (Salvadori, 1892) - S Sulawesi
G. t. auripectus Stresemann, 1941 - SC & SE Sulawesi



Descriptive notes. c. 32-35 cm. Forehead bright golden, crown grey tipped bronzy green; broad purple collar on hindneck; face and throat pale grey; upper breast and sides of neck darker grey, tinged greenish gold; lower breast pale creamy gold, becoming whitish on belly and undertail-coverts; flanks buff; mantle and upper back olive-brown with strong reddish-mauve or (in some lights) bronzy green iridescence; rest of upperparts warm olive-brown becoming reddish brown on wing-coverts and outer secondaries; primaries darker brown; underwing-coverts brown and white; feet purplish red; bill dark purplish grey. Sexes

similar, but female slightly duller. Juvenile mainly brownish with rusty edges to feathers, rusty cream where adult is whitish or golden; neck band dull purplish brown. Race *bimaculata* has purple neck band divided into two patches on either side of neck; *auripectus* similar, but differs further in having breast and middle of belly deeper golden yellow.

Habitat. Primary forest in lowlands, hills and mountains, from sea-level up to 2000 m.

Food and Feeding. Reported to feed on seeds and fruits; like other members of genus, takes some insects and probably other invertebrates as well. Forages on the ground; occurs singly or in pairs.

Breeding. Nest with egg reported in Nov; no other information.

Movements. No information on dispersal. Almost exclusively terrestrial; when flushed, flies only a short distance with heavy wingbeats and then flees on foot.

Status and Conservation. Not globally endangered. Very little information available on status; described as being locally moderately common. Uncommon in Dumoga-Bone National Park in Minahassa Peninsula, N Sulawesi. Held in several zoos and collections.

Bibliography. Andrew (1992), Coates & Bishop (1997), Gibbs (1990), Holmes & Phillips (1996), Riley (1924), Rozendaal & Dekker (1989), Stresemann (1941), Sujatnika *et al.* (1995), Watling (1983), White & Bruce (1986).

169. White-breasted Ground-dove
Gallicolumba jobiensis

French: Gallicolombe de Jobi **German:** Jobitaube **Spanish:** Paloma-perdiz Pechiblanca
Other common names: Jobi/Yapen/Purple Ground-dove, White-breasted Ground-pigeon

Taxonomy. *Phlegoenas* [sic] *jobiensis* A. B. Meyer, 1875, Yapen Island.
Forms a superspecies with *G. kubaryi*, *G. erythroptera* and *G. xanthonura*; this group also has somewhat more distant affinities with *G. stairi*, *G. sanctaerucis* and *G. salamonis*. Two subspecies recognized.

Subspecies and Distribution.
G. j. jobiensis (A. B. Meyer, 1875) - New Guinea (except Vogelkop and CS), Yapen, Manam and Karkar, Bismarck Archipelago and D'Entrecasteaux Is (Goodenough, Ferguson).
G. j. chalconota Mayr, 1935 - Guadalcanal and Vella Lavella (C & S Solomon Is).



Descriptive notes. 24-25 cm; 126-158 g. Head and face greyish black with a broad white superciliary line extending from base of upper mandible over and behind eye; throat and breast white; hindneck and sides of neck, mantle, scapulars and area bordering white throat and breast purple; rest of upperparts and basal parts of purple feathers slaty black with faint greenish gloss on back, rump and inner secondaries; tail slaty black; outer feathers with grey tips; underparts below white breast shield very dark slate grey; iris dark brown; bill black; feet and legs dark purplish red. Female similar, but white breast suffused buffy or greyish pink;

underparts except dark area bordering breast shield are paler slate grey; and purple tips to upperpart feathers are less extensive, giving the impression that the purple areas are mottled greenish black. Juvenile dark brownish grey with rufous fringes to most feathers; in some birds, white or cream breast feathers appear in first moult; in others the first breast feathers are whitish grey (males) or dull grey (females). Race *chalconota* differs in having a slightly heavier bill, and purple of upperparts confined to a band across upper mantle and lesser wing-coverts; female (known from single specimen) very different, being all dark brown, slightly paler below.

Habitat. Rain forest, monsoon forest, secondary forest and brushy gardens up to 2300 m on New Guinea, and to at least 1500 m on New Britain.

Food and Feeding. Diet consists of fruits and seeds, with some insects. Not as exclusively terrestrial as some other members of the genus (e.g. *G. rufigula*); sometimes feeds 12-20 m up in the canopies of fruiting trees or climbing bamboos.

Breeding. Nesting habits in the wild undescribed. Testes of 2 males taken in Jul were slightly enlarged. In captivity, lays 2 eggs.

Movements. At least partially nomadic, appearing in some areas only when wild bamboo sets profuse seed.

Status and Conservation. Not globally threatened. Very little information available. Generally scarce, but may be locally common in foothill areas. Held in several zoos and collections.

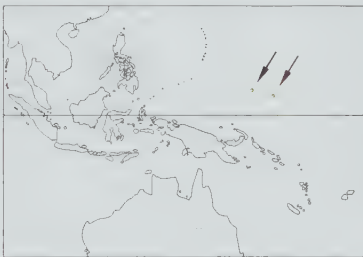
Bibliography. Andrew (1992), Beehler (1978b), Beehler *et al.* (1986), Bright (1922), Cain & Galbraith (1956), Coates (1985), Coles (1995), Diamond (1972a), Holyoak (1978), Majnep & Bulmer (1977), Mayr (1945b), Mayr & Rand (1937), Rand & Gilliard (1967), Stokes (1924).

170. Caroline Ground-dove
Gallicolumba kubaryi

French: Gallicolombe de Kubary **German:** Karolinentaube **Spanish:** Paloma-perdiz de las Carolinas
Other common names: White-breasted(!)/White-fronted/Purple/Ponape/Pohnpei/Truk Ground-dove

Taxonomy. *Phlegoenas* [sic] *Kubaryi* Finsch, 1880, Chuk and Pohnpei, Caroline Islands.
Forms a superspecies with *G. jobiensis*, *G. erythroptera* and *G. xanthonura*; this group also has somewhat more distant affinities with *G. stairi*, *G. sanctaerucis* and *G. salamonis*. Formerly considered a subspecies of *G. xanthonura*. Monotypic.

Distribution. Chuk (Truk) and Pohnpei, in C & E Caroline Is.



Descriptive notes. 28 cm. Forehead, cheeks, throat and breast white; hindcrown, nape and stripe behind eye black; upperparts and wing-coverts iridescent reddish purple; flight-feathers and tail slaty black; belly dark greyish black; iris dark brown; bill black; legs and feet purple-red. Sexes similar but female has tawny feather tips to underparts, giving paler appearance. Juvenile dark rusty brown with golden rufous feather fringes and olivaceous bases to feathers.

Habitat. On Pohnpei, inhabits brushy ravines and lowland forest, including mangroves. Appears to prefer particularly ravines where *Hibiscus* (*Hibiscus tiliaceus*) forms dense thickets; much of this habitat is near settled areas, and is much disturbed and modified. On Chuk, species is found in various habitats from atoll strand to agricultural forest, and native forest at higher elevations; nests in deep forest, up to 180 m elevation. Usually found on the ground or low in the understorey.

Food and Feeding. Little information. On Pohnpei, reported to feed on seeds, worms and small snails, and even to use stones upon which it breaks the snail shells. On Chuk, considered an agricultural pest because of its habit of eating seeds and young sprouts in newly planted fields. Feeds primarily on the ground.

Breeding. On Chuk, nests with eggs found in Feb, Apr, Jun and Sept; males with enlarged gonads taken on Pohnpei in Nov-Dec. Nest is flimsy platform of twigs; one on Chuk had several green leaves twined into the structure; diameter c. 23 cm; placed in bush, tree or tree-ferns 3-10 m up. One white egg. No information available on incubation period or parental care.

Movements. No information available. When flushed, flies short distance with characteristic quiet, fluttery flight; does not appear to fly above canopy, as does closely related *G. xanthonura* in Northern Marianas; when walking, described as moving in a jerky haphazard manner like a domestic chicken.

Status and Conservation. **ENDANGERED.** Population on Pohnpei was estimated as 841 birds in 1983/84, and on Chuk as 294 in 1983/84; however, species may have suffered severe decline on Chuk since 1970's (only one individual detected on Tol, and none on Weno, in 1994), and appeared scarce on Pohnpei on recent visits (detected mostly in mangroves). This species is secretive and almost silent, and thus difficult to detect. Not protected on either Chuk or Pohnpei, and hunting may be the most serious threat faced by the species; although it occurs in disturbed habitats, it could be threatened by conversion of forested land.

Bibliography. Baker (1951), Brandt (1962), Collar *et al.* (1994), Dahl (1986), Engbring *et al.* (1990), Pratt *et al.* (1987), Ralph & Sakai (1979).

171. Polynesian Ground-dove
Gallicolumba erythroptera

French: Gallicolombe érythroptère **German:** Tahititaube **Spanish:** Paloma-perdiz de Tuamotu
Other common names: Society/Tuamotu/White-breasted(!) Ground-dove

Taxonomy. *Columba erythroptera* J. F. Gmelin, 1789, Moorea, Society Islands.
Forms a superspecies with *G. jobiensis*, *G. kubaryi* and *G. xanthonura*; this group also has somewhat more distant affinities with *G. stairi*, *G. sanctaerucis* and *G. salamonis*. White-headed males, known from eight islands in N & C Tuamotu Archipelago, have been accorded subspecific recognition by some authorities as race "*pectoralis*"; however, all males in population recently discovered on Rangiroa Atoll (N Tuamotus) are grey-headed birds; previously only white-headed males had been recorded in this part of the archipelago; taxonomic status of the birds on Rangiroa unknown, and internal taxonomy of whole species requires reassessment. Monotypic.

Distribution. Tuamotu Archipelago, where known to survive only on uninhabited atolls, in NW on Rangiroa (Palliser Is) and in SE on Maria and Matureivavao (Actaon Group). Formerly more

widespread through Tuamotus (Aratika, Vanavana, Tenararo, Tenarunga), and also occurred on Moorea and Tahiti in Society Is.



Descriptive notes. 25 cm. Male very similar to *G. kubaryi*, having white forehead, cheeks, throat and breast; grey of crown, nape and auricular stripe not as dark; some males have all-white heads; upperparts dark olive grey with purple or, when faded, chestnut red iridescence on hindneck and wing-coverts; underparts blackish; iris brown, bill black, feet and legs purplish black. Female very different, generally bright reddish brown strongly tinged reddish purple on crown, neck and wing-coverts, and more or less dark olive on mantle, back, rump and inner wing-coverts; obscure breast shield is paler than rest of underparts; plumage very apt to fade and bleach with wear. Juvenile strongly red above and below, with many feathers fringed cinnamon-rufous; young male differs from young female in earlier appearance of breast shield and purple-edged feathers to scapulars and lesser coverts.

Habitat. Little information. In past, presumably found in forest habitat on Tahiti and Moorea; currently restricted to atolls, where main habitat is thought to be littoral scrub; in Rangiroa Atoll, found on forested islets.

Food and Feeding. Limited information from Actaeon Group and Rangiroa Atoll indicates that species eats seeds, including those of *Tournefortia* (Boraginaceae), *Digitaria* and *Morinda* (Rubiaceae), buds of *Portulaca* and leaves of *Euphorbia*.

Breeding. Virtually no information; immatures have been noted in Jan and Apr.

Movements. No information.

Status and Conservation. **CRITICALLY ENDANGERED.** Extinct in Society Is, and restricted to a few uninhabited atolls in Tuamotus, where relatively recent records come only from Matureivavao (seen in 1968) and Rangiroa Atoll (population of 12-20 birds estimated in 1990/91). Species has been recorded on a total of 20 islands, but is apparently extinct on at least nine of these; six more have not been visited by ornithologists since 1922/23, although in 1989 species was not recognized by local people who visit two of these islands in N Tuamotus. This remote archipelago is rarely visited by ornithologists, and current distribution and status of the species are very poorly known; there are c. 20 apparently suitable atolls for this species within the archipelago which have never been surveyed for birds. In addition, the species went unnoticed on Rangiroa Atoll during visits to this group of islets in early 1970's. Species was probably exterminated on Tahiti and Moorea by introduced rats and cats, and surviving populations remain extremely vulnerable to these threats.

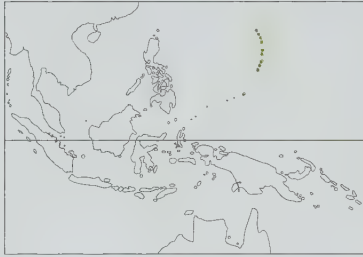
Bibliography. Bruner (1972), Collar & Andrew (1988), Collar *et al.* (1994), Dahl (1986), Ferguson-Lees & Faull (1992), Hay (1986), Holyoak & Thibault (1984), King (1978/79), Lacan & Mougins (1974), Monnet, Sandford *et al.* (1993), Murphy (1924a), Pratt *et al.* (1987), Seitre, J. & Seitre (1991), Seitre, R. & Seitre (1992), Thibault (1988).

172. White-throated Ground-dove
Gallicolumba xanthonura

French: Gallicolombe pampusane **Spanish:** Paloma-perdiz de las Marianas
German: Jungferntaube
Other common names: White-throated Dove, White-throated/Mariana/Yap/White-breasted Quail-dove

Taxonomy. *Columba xanthonura* Temminck, 1823, Marianas. Forms a superspecies with *G. jobiensis*, *G. kubaryi* and *G. erythroptera*; this group also has somewhat more distant affinities with *G. stairi*, *G. sanctaecrucis* and *G. salamonis*. In past, *G. kubaryi* was listed as race of present species. Monotypic.

Distribution. Mariana Is on Asuncion, Pagan, Alamagan, Saipan, Tinian, Agiguan, Rota and Guam; also Yap I in Caroline Is.



Descriptive notes. 25 cm; male 117-154 g, female 58-150 g. Shows strong sexual dimorphism in plumage. Male has crown, nape, hindneck and ear-coverts pale pinkish rufous; rest of head, neck and breast shield white with salmon-pink suffusion except along margin of breast shield; band of rich purple extends across upper back, dividing the pale hindneck from the dark bronzy olive upperparts; lesser wing-coverts purple; median wing-coverts broadly tipped purple; underparts greyish black fringed dull rufous; tail dark brownish grey; iris brown; orbital skin yellowish white; bill black or dark brown; legs and feet purplish red. Female predominantly tawny

brown below and bronzy olive above, with tawny rufous fringes to feathers; iris grey or brown; orbital skin grey; legs and feet purplish red; females with plumage like male's occur, apparently rarely. Juvenile appears predominantly bright rufous due to extensive feather fringes. Young males have broader and richer rufous tips to feathers than young females.

Habitat. Occurs in all types of forested habitat, and seems to be equally at home in native forest and secondary or agricultural forest; however, unlike many other native birds, does not seem to have adapted readily to introduced *Leucaena* forest in Marianas. On Yap, sometimes found near residential areas.

Food and Feeding. Primarily frugivorous, but also eats seeds and flowers, and occasionally leaves. Reported food plants include: fruits of *Aglaia* (Meliaceae), *Ficus* (Moraceae), *Guettarda* (Rubiaceae), *Momordica* (Cucurbitaceae), *Premna* (Verbenaceae), *Scaevola* (Goodeniaceae) and papaya (*Carica*, Caricaceae); seeds of *Glochidion* (Euphorbiaceae), *Tournefortia* (Boraginaceae) and *Passiflora* (Passifloriaceae); flowers of *Tournefortia* and *Premna*; and leaves of *Cestrum* (Solanaceae) and *Pandanus* (Pandanaceae). Unlike most *Gallicolumba*, in Marianas present species feeds primarily in bushes and trees, not on the ground, and birds on Guam were only very rarely seen on ground, usually feeding c. 1 m up in trees and bushes; Yap population apparently forages largely on the ground.

Breeding. Nests reported from Guam in Jan-Mar, May and Aug; recently fledged males, and courtship and mating, in Sept and Nov; males with enlarged gonads in Apr-Jul; based on this evidence, breeding probably occurs all year round at least on Guam. Nests reported from 1-5 m to much higher in large, occasionally isolated, trees; both adults observed nest building. One clutch of 2 eggs was reported at a nest on Guam, attended only by female; however, another nest on Guam apparently only attended by male.

Movements. In Marianas, frequently makes long, solitary flights above the canopy, unusual behaviour for the genus; flies with deep, laboured wingbeats, but covers great distances; it has been suggested that these long flights indicate widely separated feeding grounds. On Yap, apparently does not make long flights above canopy.

Status and Conservation. Not globally threatened. Currently considered near-threatened. Now rare on Guam, and possibly even extirpated, although was fairly common there in 1945, when roadside surveys recorded it during 31% of 125 such counts; described as common on the island in 1900 and 1931. Uncommon to rare in Northern Marianas, with highest population on Rota; total population on Rota was estimated to be 2400 birds in 1982; described as numerous in these islands in 1945, when a small population was present on Tinian. Rare on Yap, where total population was estimated at c. 195 birds in 1984. Species is secretive, and easily overlooked on surveys. Population on Guam has declined mainly due to predation by introduced brown tree snake (*Boiga irregularis*), and populations elsewhere in Marianas are vulnerable to accidental introduction of this predator. Species does not seem to be threatened by the low levels of hunting it experiences; also, able to adapt to secondary habitats, and does not appear to be threatened in short term by habitat loss.

Bibliography. Anon. (1966, 1968), Baker (1951), Collar *et al.* (1994), Dahl (1986), Engbring *et al.* (1986, 1990), Fisher (1950), Jenkins (1983), Jenkins & Aguon (1981), Kibler (1950), Marshall (1949), Mayr (1945b), McGowan *et al.* (1964), Pratt *et al.* (1979, 1987), Seale (1901), Stopher (1946).



173. Friendly Ground-dove

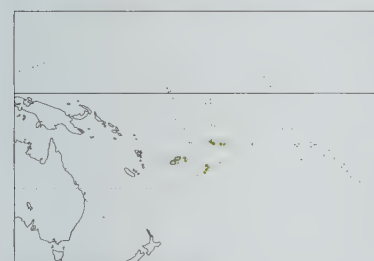
Gallicolumba stairi

French: Gallicolombe de Stair **German:** Purpurschultertaube **Spanish:** Paloma-perdiz de las Fiji
Other common names: Friendly/Purple-shouldered/Samoan/Tongan/Fiji/Shy Quail-dove, Shy Ground-dove

Taxonomy. *Calenas* (*Phlegænas* [sic]) *Stairi* G. R. Gray, 1856, Samoa. Probably most closely related to *G. sanctaecrucis*; both have been included in a superspecies with *G. jobiensis*, *G. kubaryi*, *G. erythroptera* and *G. xanthonura*, and also *G. salomonis*; present species might be related, more distantly, to *G. beccarii*, *G. canifrons* and *G. hoedtii*. Type specimen was bird from London Zoo of uncertain origin; some authorities have questioned designation of Samoa as type locality, suggesting Tonga as more probable origin, but the limited series of specimens do not justify altering the designated locality, so birds from Fiji and Tonga are currently placed in race *vitiensis*; under alternative arrangement, Samoan populations were placed in race *samoensis*. Two subspecies recognized.

Subspecies and Distribution.

G. s. stairi (G. R. Gray, 1856) - Wallis and Futuna Is. and Samoa (Savaii, Upolu, Aliepata Is, Ofu).
G. s. vitiensis (Finsch, 1872) - Fiji and Tonga (Vava'u, Ha'apai and Nomuka groups).



Descriptive notes. 25-26 cm; 171 g. Mostly dark brown, with paler vinaceous brown head and breast shield; crown and nape grey; lower margin of breast cream-coloured; iridescent purple upperparts, especially lesser wing-coverts; bill black; feet and legs purplish red. Female dimorphic: one form closely resembles male, the other has completely brown underparts with, at most, an inconspicuous paler breast shield. In Fiji, the two female morphs are more or less equally abundant; in Tonga and Samoa, almost all females resemble males. Juvenile reddish brown with paler feather edgings. Races differ slightly in size and coloration, *vitiensis* being larger and

having a darker breast shield.

Habitat. Found in a variety of forest types, including lowland rain forest, bamboo thickets and gallery forest up to at least 1500 m. In Samoa, known surviving populations inhabit open forest on scree slopes or near the littoral strand on small and undeveloped islands.

Food and Feeding. Diet varied, including seeds, fruit, buds, young leaves, insects and snails. Gizzard is thick and muscular, suggesting the ability to process hard seeds. Feeds on the ground or in understorey.

Breeding. Nests recorded Jul-Jan. An insubstantial nest of interwoven twigs, vine stems and rootlets, usually 1-3 m above the ground in a small tree in undergrowth, or in crown of tree-fern. Lays 1-2 pure white eggs.

Movements. Presumably sedentary. Prefers to escape by running rather than flying, but can fly swiftly and strongly; takes off with loud wing-clapping.

Status and Conservation. Not globally threatened. Currently considered near-threatened. Appears to be in serious decline through much of its range. In Western Samoa, has been found in recent years only on the tiny Aliepata Is, off SE corner of Upolu. In American Samoa, there is only a single recent sighting (1993) on the small island of Ofu. In Tonga, a healthy population occurs on isolated and largely undisturbed island of Late; species is also found on Hunga Ha'apai and the island of Vava'u. In Fiji, recent data are lacking; in 1970's, species remained locally common in some areas. Probably threatened by introduced mongooses and rats, as well as by habitat loss. Detection of the species is difficult because of its shy and secretive behaviour; populations require monitoring, and current status in Fiji requires investigating.

Bibliography. Amadon (1943), Amerson *et al.* (1982), Armstrong (1932), Bailey (1992b), Banks (1984), Beichle (1989, 1991b), Clapp & Sibley (1966), Clunie (1984), Dahl (1986), DuPont (1976), Engbring & Ramsey (1989), Gorman (1975), Guyot & Thibault (1988), Holyoak (1979), Mayr (1945b), Muse & Muse (1982), Pratt *et al.* (1987), Reed (1980b), Rinke (1987, 1994), Rinke *et al.* (1992), Watling (1982a), Whitmee (1875), Yaldwyn (1952).

174. Santa Cruz Ground-dove

Gallicolumba sanctaecrucis

French: Gallicolombe de Santa Cruz **Spanish:** Paloma-perdiz de Santa Cruz
German: Santa-Cruz-Taube
Other common names: Santa Cruz Ground-pigeon, Santa Cruz Quail-dove

Taxonomy. *Gallicolumba sanctaecrucis* Mayr, 1935, Tinakula, Santa Cruz Islands. Closely allied to *G. stairi* and *G. salomonis*, and more distantly to the *G. jobiensis* superspecies. Monotypic.

Distribution. Santa Cruz Is (Tinakula and Utupua) and Vanuatu (Espiritu Santo). Possibly extinct on Utupua.



Descriptive notes. 22-25 cm. Crown, nape, upper neck and upper back brown; rest of upperparts chocolate brown suffused glossy purple and with a large metallic violet-purple patch at bend of wing; forehead, sides of head and neck light grey; throat and breast shield form large white patch tinged pinkish-buff, greyer on sides; abdomen chocolate-brown; primaries and tail feathers dark brown; iris brown; bill black; legs and feet purplish red. Female browner; head, neck and breast shield tawny chestnut; back, tail and wings with uniform dull greenish gloss; belly grey-brown. Juvenile uniform brown, with metallic purple

shoulder patch.

Habitat. On Vanuatu, recorded in mid-elevation ancient rain forest up to c. 1000 m; despite exploration, species not found in apparently suitable forest that remains above this altitude. Also recorded lower down in area with patches of forest on margins of pastures.

Food and Feeding. Feeds on seeds, berries, and plant shoots, as well as insects and worms. Primarily terrestrial, although frequently perches on low branches and roosts in trees.

Breeding. No definite records, but local people report that the nest of this species resembles that of *Chalcophaps indica*; 1 white egg may be usual clutch.

Movements. No information on seasonal movements. Tends to flee on foot, but can fly swiftly when flushed; if flushed, takes off with a loud wing-clap, then quickly lands and runs to hide.

Status and Conservation. VULNERABLE. Recent information suggests the species may be extinct on Utupua. Rarely seen in Vanuatu, where habitat destruction is proceeding rapidly, with lack of effective controls on logging activity; in addition, species is hunted and killed by feral dogs. Like other members of the genus, species is shy and inconspicuous, making survey work more difficult and often inconclusive.

Bibliography. Bregulla (1992), Collar & Andrew (1988), Collar *et al.* (1994), Dahl (1986), Diamond & Marshall (1976), Mayr (1945b).

175. Thick-billed Ground-dove

Gallicolumba salomonis

French: Gallicolombe des Salomon **Spanish:** Paloma-perdiz de las Salomon
German: San-Cristobal-Taube

Taxonomy. *Phlogænas* [sic] *salomonis* E. P. Ramsay, 1882, San Cristobal, Solomon Islands. Known only from two specimens of unknown sex. Appears to be closely allied with *G. sanctaecrucis* and (especially) *G. stairi*, and more distantly to the *G. jobiensis* superspecies. Monotypic.

Distribution. SE Solomon Is, known only from Ramos (between Santa Isabel and Malaita) and San Cristobal.



Descriptive notes. c. 25 cm. Similar to *G. stairi* but has thicker bill with more deeply curved culmen; reddish brown above with purple iridescence, especially on mantle and wing-coverts; head pale chocolate brown, paler on face; breast shield light reddish brown, small purple patch at each side of breast; rest of underparts dark reddish brown.

Habitat. Collected in lowland forest, where recorded up to c. 300 m.

Food and Feeding. No information available.

Breeding. No information available.

Movements. No information available.

Status and Conservation. CRITICALLY EN-

DANGERED. Has not been recorded since 1927. Like other members of the genus, it is very shy and inconspicuous, and may be confused with the more abundant and partially sympatric *G. beccarii*. If the species survives, it faces two particularly severe threats: habitat loss, as most accessible forest on San Cristobal has been targeted for logging; and introduced predators, e.g. feral cats, which have wiped out all native terrestrial mammals on nearby Guadalcanal. It is plausible that the complete lack of recent observations could be because the species actually inhabits a different habitat to that in which it is expected to occur; for instance, it might turn out to inhabit swamps, which to date have not been surveyed. Thorough surveys urgently needed in order to locate any populations that may still survive; in the event of their discovery, intensive research would become an immediate priority.

Bibliography. Cain & Galbraith (1956), Collar & Andrew (1988), Collar *et al.* (1994), Dahl (1986), Mayr (1945b).

176. Marquesas Ground-dove

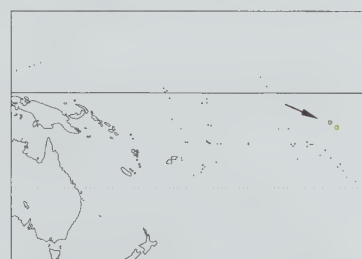
Gallicolumba rubescens

French: Gallicolombe des Marquises **Spanish:** Paloma-perdiz de las Marquesas
German: Marquesastaube
Other common names: Grey-hooded/Marquesas Quail-dove, Grey-hooded Ground-dove

Taxonomy. *Columba rubescens* Vieillot, 1818, Nukuhiva, Marquesas.

A very distinct form of uncertain affinities; appears to be intermediate between *G. beccarii* and members of the *G. jobiensis* superspecies, and may represent an early colonization of Marquesas by a form ancestral to both. Monotypic.

Distribution. Marquesas Is, surviving only on two uninhabited islands, Fatu Huku and Hatuta'a. First described from Nukuhiva, and archaeological remains indicate species probably once occurred throughout the archipelago (confirmed from Hivaoa, Tahuata and Uahuka).



Descriptive notes. 20 cm. Body posture typically hunched, with wings somewhat drooped. Head, neck, throat and breast ash grey (degree of darkness variable); back and sides of hindneck, lesser wing-coverts and some median wing-coverts rich purple, reddish brown when worn; rest of plumage greenish black above and dull black below; basal half of primaries and tail feathers white, forming conspicuous patches when spread, although extent of white very variable; iris brown; bill black; feet and legs purplish to reddish black. Female similar but has reduced white in wing and particularly tail, and more extensive greenish gloss

on upperparts; some are also darker grey on the head, neck and throat. Juvenile has very little white in wings and usually none in the tail feathers, which are grey at the base; duller than adult and has rust-brown fringes to most feathers, especially prominent on the back, wings and head.

Habitat. Little information. Reportedly found in shrubby vegetation.

Food and Feeding. Little known. Reported to feed on the seeds of *Pisonia* (Nyctaginaceae). Feeds almost entirely on the ground. Individuals in captivity foraged actively, digging in the soil and turning over dead leaves, using their bills.

Breeding. No information from the wild. In captivity: birds built a typical pigeon nest of twigs; 2 white eggs; incubation 13-15 days.

Movements. Reportedly flies weakly and reluctantly. Captive birds described as being very like rails or gamebirds in general deportment; wings often slightly drooped as the bird walks, revealing the prominent white wing patches.

Status and Conservation. ENDANGERED. Restricted to two small uninhabited islands, where it would be extremely vulnerable to introduction of rats, cats or other predators; the extermination of this species on the inhabited Marquesas Is was probably caused by introduced predators, perhaps in association with hunting. Population on Hatuta'a estimated at c. 225 birds in 1975, and was considered to be stable in 1987.

Bibliography. Bruner (1972), Collar & Andrew (1988), Collar *et al.* (1994), Dahl (1986), Gifford (1925), Hay (1986), Holyoak & Thibault (1984), King (1978/79), Murphy (1924a), Pratt *et al.* (1987), Seitre, J. & Seitre (1991), Seitre, R. & Seitre (1992), Steadman (1989a), Thibault (1988).

177. Bronze Ground-dove

Gallicolumba beccarii

French: Gallicolombe de Beccari **German:** Graubrusttaube **Spanish:** Paloma-perdiz Pechigrís
Other common names: Beccari's/Grey-throated Ground-dove; Grey-breasted Quail-dove

Taxonomy. *Chalcophaps beccarii* Salvadori, 1876. Arfak Mountains, New Guinea. Affinities unclear: may form a superspecies with *G. canifrons*, and these two also appear to be related to the *G. jobiensis* superspecies; alternatively, may be related to *G. stairi* and *G. sanctaerucis*, and more distantly to *G. canifrons* and *G. hoedtii*. Six subspecies recognized.

Subspecies and Distribution.

G. b. beccarii (Salvadori, 1876) - mountains of New Guinea.

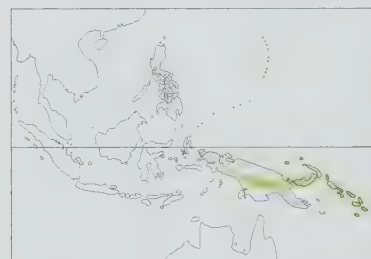
G. b. johannae (P. L. Sclater, 1877) - Karkar I, Bismarck Archipelago (except ranges of following two races) and Nissan I (E of S New Ireland).

G. b. eichhorni Hartert, 1924 - St Matthias Group (Mussau, Emira).

G. b. admiralitatis (Rothschild & Hartert, 1914) - Admiralty Is (Manus).

G. b. intermedia (Rothschild & Hartert, 1905) - W Solomon Is (including Bougainville).

G. b. solomonensis (Ogilvie-Grant, 1888) - E Solomon Is (including Rennell).



Descriptive notes. 18-20 cm; male 84-104 g, female 59 g. Forehead and area above and behind eyes dark blue-grey becoming dark iridescent green on crown and nape, pale grey on breast and lower breast and greyish white on rear edge of breast shield; border of breast shield tipped purple at sides and blackish purple on lower breast; rest of underparts blackish grey; hindneck, upperparts, central tail feathers, median and greater wing-coverts, and inner secondaries dark olive-green with bronzy green gloss; lesser wing-coverts dark purple; primaries and outer secondaries black; outer tail feathers dark grey with poorly defined black subterminal bands and brownish tips; iris brown, orbital skin creamy white; bill black, feet and legs purplish red. Female has dark grey head and upper breast, rest of underparts dull yellowish brown; grey of head and neck suffused brown; lacks purple on wings and sides of breast. Juvenile similar to female, but duller and browner, with rufous fringes to feathers of wings and breast, and to a lesser extent elsewhere. Race *johannae* slightly larger, with upperparts of male glossed bronzy purple and the brown plumage paler and redder; *admiralitatis* similar, but has head entirely blue-grey and breast shield becomes white only at median part of border, whereas female has fairly clearly demarcated dark grey breast shield; other races show only minor variations in plumage from one or another of these forms.

Habitat. Montane forest at 1200-2700 m, in mainland New Guinea, but from lowlands to lower mountains on outlying islands.

Food and Feeding. Feeds on fallen fruits, seeds and insects; stomachs of collected birds often contain gravel or pebbles, presumably ingested as grit. Apparently becomes abundant in areas where wild bamboo is setting seed. Primarily terrestrial, but may perch in low branches.

Breeding. Nesting recorded in Jan in New Guinea (Whiteman Range); in Jun and Aug on Nissan I. Nest is a flimsy platform of twigs and decayed leaves; reported locations include on a log and on the ground, as well as in low vegetation up to 3 m above ground. Lays 1 white egg.

Movements. Apparently partially nomadic, as populations may increase dramatically and also nest in areas where wild bamboo is setting seed.

Status and Conservation. Not globally threatened. Generally scarce, but may be locally common, as evidenced by reports of abundance at seeding bamboo. As with other ground-doves, easily overlooked, e.g. only recently recorded at Wara Sol, despite previous fieldwork in this area. Widely distributed in mountains of New Guinea; status uncertain in Bismarck Archipelago and Solomons.

Bibliography. Amadon (1943), Andrew (1992), Beehler (1978b), Beehler *et al.* (1986), Cain & Galbraith (1956), Coates (1985), Coles (1995), Diamond (1972a), Gilliard & LeCroy (1967a), Hachisuka (1931a), Hadden (1981), Majnep & Bulmer (1977), Mayr (1945b), Mayr & Rand (1937), Peckover & Filewood (1976), Rand & Gilliard (1967), Rowland (1995), Salomonsen (1972), Schmid (1993).

178. Palau Ground-dove

Gallicolumba canifrons

French: Gallicolombe des Palau **German:** Graustrintaube **Spanish:** Paloma-perdiz de las Palau
Other common names: Pelew/Grey-fronted Ground-dove

Taxonomy. *Phlegoenas* [sic] *canifrons* Hartlaub & Finsch, 1872. Palau.

Affinities unclear: may form a superspecies with *G. beccarii*, and these two also appear to be related to the *G. jobiensis* superspecies; alternatively, may be related to *G. hoedtii*, and more distantly to *G. beccarii*, *G. stairi* and *G. sanctaerucis*. Monotypic.

Distribution. Palau, from Babelthup S to Angaur.

Descriptive notes. 22 cm. Head and breast bluish grey, darker on the crown and paler on upper breast; throat whitish; lower breast tinged pinkish, with white posterior margin to breast shield; rest



Breeding. No information available.

Movements. No information on movements or on size of home range. Rarely flies above the canopy, and is primarily terrestrial; walks swiftly and gracefully; when flushed, leaps from the ground with a loud wing-clap and flies swiftly for a short distance.

Status and Conservation. Not globally threatened. Currently considered near-threatened. Very little precise information available. Rare on Babelthup; reportedly uncommon on the numerous small rock islands S of Koror, although not actually detected at all on the most recent surveys. Difficult to survey because it is secretive and largely silent, e.g. a survey in 1931 completely failed to locate the species. The most recent assessment considered the population to be stable and relatively secure, as it is not hunted and its favoured habitat on the rock islands is not in imminent threat of development. Species was removed from the USA Endangered Species List in 1985. Research required; populations need surveying and periodic monitoring.

Bibliography. Amadon (1943), Anon. (1985c), Baker (1951), Collar *et al.* (1994), Dahl (1986), Engbring (1992), Marshall (1949), Mayr (1936a, 1945b), Pratt, Bruner & Berrett (1987), Pratt, Engbring *et al.* (1980).

179. Wetar Ground-dove

Gallicolumba hoedtii

French: Gallicolombe de Wetar **German:** Wetartaube **Spanish:** Paloma-perdiz de la Wetar
Other common names: Wetar Dove

Taxonomy. *Leptoptila* [sic] *hoedtii* Schlegel, 1873. Wetar.

Formerly isolated in monospecific subgenus *Alopecoenas*; a distinctive form of uncertain affinities, perhaps an early derivative of *G. jobiensis* stock. Monotypic.

Distribution. Timor and Wetar (E Lesser Sundas).



Descriptive notes. c. 27 cm. Differs from other *Gallicolumba* in having a strongly attenuated outermost primary, with the next four emarginated on the outer web. Head light blue-grey becoming greyish white on throat; hindneck reddish brown becoming pale rufous on sides of neck and reddish cream or cream on breast; narrow band of shining purple or bluish purple bordering breast and carpal patch of same colour; underparts except breast dark brownish grey to dull black; upperparts chestnut except purple carpal patch; central tail feathers dark reddish brown; outer ones brownish grey with poorly defined dark subterminal bar; underwing chestnut; undertail blackish; iris blackish brown; bill black; legs and feet reddish purple. Female has head, neck and breast light rusty chestnut; upperparts and belly olive brown, tinged reddish; tail chestnut with only a trace of dark subterminal bar. Juvenile undescribed.

Habitat. Forested lowlands and hill monsoon forest, up to 950 m on Timor. Apparently solitary.

Food and Feeding. No information available.

Breeding. No information available.

Movements. No information available.

Status and Conservation. VULNERABLE. Only three records from Timor, the most recent in 1993 near Soe, during a nine-week forest-bird survey, and where forest habitat has been greatly reduced and fragmented. Status on Wetar unknown; in 1911, species was found to be local but moderately common; next visit by ornithologists was not until 1990, when species was not recorded during a brief visit, but extensive forests remain in NW of island, suggesting that species should still survive there. Surveys urgently needed in order to establish true status of species; extensive research also needed.

Bibliography. Amadon (1943), Andrew (1992), Coates & Bishop (1997), Collar & Andrew (1988), Collar *et al.* (1994), Mayr (1944b), Noske (1995), Sujatnika & Jepson (1995), Sujatnika *et al.* (1995), White & Bruce (1986).

Genus TRUGON G. R. Gray, 1849

180. Thick-billed Ground-pigeon

Trugon terrestris

French: Trugon terrestre **German:** Erdtaube **Spanish:** Paloma-perdiz Picogorda
Other common names: Grey/Slaty Ground-pigeon, Thick-billed Jungle-pigeon

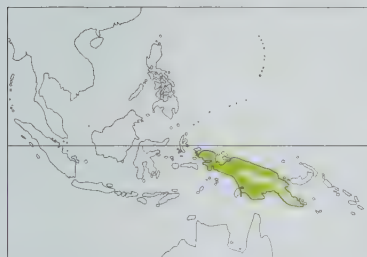
Taxonomy. *Trugon terrestris* G. R. Gray, 1849, Triton Bay, north-west Guinea. Has no obvious close relatives. Three subspecies recognized.

Subspecies and Distribution.

T. t. terrestris G. R. Gray, 1849 - Salawati, and NW New Guinea E to Geelvink and Etna Bays.

T. t. mayri Rothschild, 1931 - NC New Guinea, from R Memberamo E to Humboldt Bay.

T. t. leucopareia (A. B. Meyer, 1886) - S New Guinea, from R Setekwa E to Milne Bay.



Descriptive notes. 31–35 cm; 323–400 g. Specialized thick, blunt bill. Forehead pinkish white becoming dark bluish grey on crown and nape; white to buffish white ear-coverts and throat separated by bluish grey malar stripe; blackish collar; nape feathers tend to be longer, forming a nuchal crest, especially noticeable when neck is stretched; rest of neck, mantle and breast bluish grey; wings dark brown to dull grey; rest of upperparts and tail dark brownish grey; underwings banded black and white; belly white merging to reddish buff or pale chestnut on flanks and outer webs of undertail-coverts; iris orange to ruby red; orbital skin grey; bill dark grey at base, pinkish white near tip; legs and feet pink. Sexes similar, but female has wing-coverts slightly more vinaceous. Juvenile has darker iris and dark mark on mid-ridge of the culmen; wing feathers edged rufous. Race *leucopareia* has innermost wing-coverts dark purplish chestnut and rest of coverts as well as outer webs of primaries and secondaries chestnut; *mayri* grey rather than white on face, and wing-coverts only slightly chestnut-tinged, with belly and flanks paler than in nominate.

Habitat. Inhabits rain forest and monsoon forest in lowlands and hills up to 640 m. Usually on the forest floor; typically seen singly, although one or more other birds may be nearby.

Food and Feeding. Takes seed by opening fallen fruit with its specialized blunt bill; small fruit is chewed and crushed in the bill and the contents swallowed; crushed seed and large black fruits were found in one gizzard examined. Species may visit leks of Magnificent Bird-of-paradise (*Diphylodes magnificus*) to forage for seeds disgorged by lekking birds.

Breeding. Nesting recorded in both wet and dry seasons, with no pattern evident: Feb at Geelvink Bay; Jun, Jul, Oct near R Fly; Feb–Mar near R Lakekamu; Mar, Jul near Port Moresby. Nest is sometimes a rudimentary structure consisting of a few sticks, leaves or other bits of plants, or a substantial platform of sticks and pieces of moss and dead leaves placed on the ground; concealed by being placed against the trunk, between two roots of a buttressed forest tree. Lays 1 white egg; sexes reported to share incubation duties, male during day and female at night.

Movements. Suspected of being nomadic, following food supplies, but details are lacking and in at least two areas of SE New Guinea species is known to be resident.

Status and Conservation. Not globally threatened. Currently considered near-threatened. Apparently rather scarce throughout most of range, although known to be locally common; difficult to census because of its relatively quiet and unobtrusive nature. Species is probably affected by destruction of forest tracts. Extremely rare in captivity. Populations require careful monitoring; a very distinctive species that merits further research.

Bibliography. Andrew (1992), Beehler *et al.* (1986), Bell (1982, 1984c), Coates (1985), Gómez de Silva (1993), Gregory (1995a, 1995b), Hoogerwerf (1971), Mayr & Rand (1937), Ogilvie-Grant (1915), Olson *et al.* (1981), Rand (1938, 1942a), Rand & Gilliard (1967), Rösler (1996), Safford & Atwood (1996).

Genus *MICROGOURA* Rothschild, 1904

181. Choiseul Pigeon

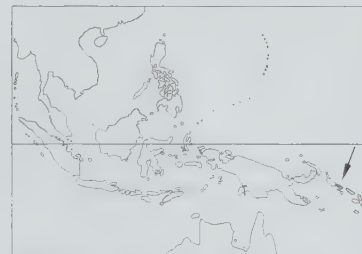
Microgoura meeki

French: Microgoura de Choiseul **German:** Salomonentaube **Spanish:** Paloma-perdiz de la Choiseul
Other common names: Solomon Crowned Pigeon, Choiseul Crested Pigeon

Taxonomy. *Microgoura meeki* Rothschild, 1904, Choiseul, Solomon Islands.

Very distinctive species with no obvious close relatives; may represent link between the large *Goura* crowned-pigeons and *Trugon terrestris*. Monotypic.

Distribution. Choiseul I in NW Solomons (almost certainly extinct).



Descriptive notes. 31–35 cm. Forehead and face black; top of head bluish grey becoming darker on back and breast; pinkish wash below eye; bushy backward-pointing crest of hair-like feathers on head; lower back and rump brownish; underparts dark buffy chestnut; wings dark brown; bill, upper mandible black, lower mandible red; gallinule-like frontal shield pale blue; iris colour uncertain, but probably either dark lemon or brown; legs purplish red.

Habitat. Not known; thought to have inhabited remote cloud forests in the island's interior; likely to have been largely ground-dwelling, feeding and nesting close to the forest floor.

Food and Feeding. No information available.

Breeding. One cream-coloured egg laid on the ground.

Movements. No information.

Status and Conservation. Almost certainly EXTINCT. Known only from six specimens taken on Choiseul in 1904. The collector, Meek, acquired the skins in trade from a coastal village; he never penetrated the interior, as local human population of interior then thought to be hostile; he was informed by local native boys that the species also occurred on the adjacent islands of Santa Isabel and Malaita; he did not encounter it on Bougainville. Five veteran collectors searched the island for 2 months in 1927 and 1929 and did not encounter the species. Members of local population, questioned regarding the disappearance of the species, believe that feral cats may have been responsible for its extirpation sometime in early 1940's.

Bibliography. Collar & Andrew (1988), Collar *et al.* (1994), Dahl (1986), Day (1989), Fuller (1987), Greenway, J.C. (1967), Mayr (1945b), Meek (1913), Parker (1972).



PLATE 16

inches 8
cm 21

PLATE 16

Family COLUMBIDAE (PIGEONS AND DOVES) SPECIES ACCOUNTS

Subfamily OTIDIPHABINAE

Genus *OTIDIPHAPS* Gould, 1870

182. Pheasant Pigeon

Otidiphaps nobilis

French: Otidiphaps noble

German: Fasantaube

Spanish: Paloma Faisán

Other common names: Green-collared/Grey-collared Pigeon, Magnificent Ground-pigeon

Taxonomy. *Otidiphaps nobilis* Gould, 1870. "Probably procured on some one of the islands of the Eastern Archipelago or in New Guinea". Affinities uncertain. Four subspecies recognized.

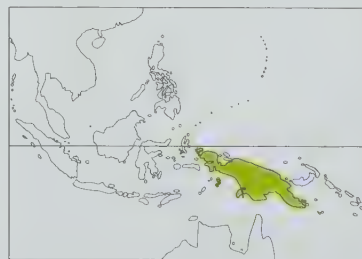
Subspecies and Distribution.

O. n. nobilis Gould, 1870 - Batanta and Waigeo, and mountains of W New Guinea (Arfak, Wandamen, Weyland, Snow and mountains on upper R Memberamo).

O. n. aruensis Rothschild, 1928 - Aru Is.

O. n. cervicalis E. P. Ramsay, 1880 - mountains of E & SE New Guinea (Saruwaged, Sepik, Kuper).

O. n. insularis Salvin & Godman, 1883 - Fergusson I (D'Entrecasteaux Is).



Descriptive notes. 45-50 cm; 500 g. Unique amongst pigeons in having a laterally compressed pheasant-like tail of 20-22 feathers, and long slender legs. Head and short nuchal crest black with green and blue gloss; breast and underparts blackish; breast glossed purple or purple and blue, belly glossed with green; nape and upper hindneck iridescent green or amethyst, below this a patch of golden-bronze or pink and purple; mantle and back iridescent reddish purple merging to chestnut on secondaries and outer wing-coverts; lower back dark purple merging to purplish blue on uppertail-coverts; tail black with greenish gloss; iris orange or orange-red, orbital ring red; bill vermilion red, sometimes orange-tipped; long slender legs yellow or salmon, vermilion red or purple at tarsal joint and forming a

greenish gloss; iris orange or orange-red, orbital ring red; bill vermilion red, sometimes orange-tipped; long slender legs yellow or salmon, vermilion red or purple at tarsal joint and forming a

thin red line down side of tarsus. Sexes alike. Juvenile duller, mainly greyish black, and dark rufous above; plumage has woolly texture, as down feathers retained on tips of juvenile feathers for quite some time. Race *aruensis* has silvery white nuchal patch and greenish iridescence on breast, with nuchal crest much reduced or absent; *cervicalis* has shorter crest than nominate, pale grey nuchal patch merging into a bronzy area, and lower back and rump dark green to bluish green; *insularis* smaller, lacks nape patch and purple sheen on mantle and wings (which are chestnut), lower back is greenish.

Habitat. Primarily hilly and lower montane areas up to 1900 m, but also in lowlands: preferred habitat is primary rain forest but sometimes encountered in foothill monsoon forest. Highly terrestrial and rather pheasant-like in its habits; usually solitary, sometimes in pairs.

Food and Feeding. Seeds and fallen fruit; pebbles up to 1 cm in diameter have been found in stomach contents. Forages by walking slowly along ground; has been recorded drinking from stream. No further information available.

Breeding. Nest with egg in Mar (late wet season) in Adelbert Mts. Nest is loose platform of 35-50 slender sticks, situated at the foot of a bush or tree, or between root buttresses. Lays 1 cream-coloured to white egg; incubation usually 23-26 days, sometimes 29 days if weather is adverse.

Movements. Sedentary.

Status and Conservation. Not globally threatened. Perhaps locally common, e.g. in highlands of NE New Guinea; but scarce or rare in most of range, e.g. in E highlands; there is evidence to suggest that species has locally become extinct, e.g. around Tabubil town, C New Guinea. Present in Varirata National Park, near Port Moresby. Because preferred habitat is primary rain forest, deforestation must negatively affect this species; however, at present large tracts of forest still remain intact within its range. Populations require monitoring; this highly distinctive species merits research.

Bibliography. Andrew (1992), Baptista & Hall (1997), Beehler (1978b), Beehler *et al.* (1986), Bell (1982), Black (1930), Coates (1985), Diamond, J.M. (1972a, 1985), Gilliard & LeCroy (1967a), Glenny & Amadon (1955), Gregory (1995a, 1995b), Mayr & Rand (1937), Oehler (1991), Ogilvie-Grant (1915), Rand & Gilliard (1967), Rösler (1996), Rutgers & Norris (1970), Wennrich (1983).

Subfamily GOURINAE

Genus *GOURA* Stephens, 1819

183. Western Crowned-pigeon

Goura cristata

French: Goura couronné **German:** Krontaube **Spanish:** Gura Occidental
Other common names: Blue/Common/Grey/Masked Crowned-pigeon/Goura

Taxonomy. *Columba cristata* Pallas, 1764, Banda; error = Fak-fak on Onin Peninsula, New Guinea. Members of genus unique amongst pigeons in having no gallbladder; also lack oil-gland and have reticulate scaling on the strong, thick legs; 16 rectrices; they have no obvious close relatives. Present species hybridizes with *G. victoria* along R Siriwo in NW New Guinea. Two subspecies recognized.

Subspecies and Distribution.

G. c. minor Schlegel, 1864 - W Papuan Is (Misool, Salawati, Batanta, Waigeo); also Seram (S Moluccas), where probably introduced.

G. c. cristata (Pallas, 1764) - NW New Guinea, from Vogelkop E to Etna Bay and R Siriwo.



Descriptive notes. 66-75 cm; 1800-2400 g. Overall coloration medium to dark greyish blue; laterally compressed crest of lacy feathers paler blue grey than rest of body, with a silvery tinge; wings and tail darker, with a slaty tint; greyish blue terminal bar on tail; upper mantle and most of wing-coverts dark purplish red; outer greater coverts white tipped purple, forming conspicuous white patch on closed wing; broad black stripe extending from base of bill through lores, surrounding the eye and terminating behind it; iris red, bill black, legs and feet dark red. Partially melanistic birds occur in both races. Sexes alike. Juvenile similar to adult but wing patch is cream-coloured; grey and red in wings of adult replaced by chestnut.

Race *minor* smaller.

Habitat. Interior of lowland rain forest; also occurs in marshy and partially flooded areas, and in mangroves. On islands of Waigeo, Batanta, Salawati and Misool occurs up to 150 m. Spends most of time on forest floor, but roosts in trees at night.

Food and Feeding. Feeds on berries, fallen fruit, grubs and insects. Forages on the ground, usually in small parties of 2-10 birds.

Breeding. Virtually nothing known of seasonality, but a male with large gonads collected in Apr in Irian Jaya. Large nest of sticks built up to 10 m above ground. Lays 1 large white egg; incubation 28-29 days; fledging 30-36 days; both parents brood and feed chick. In captivity, a fledgling returned each night to roost in its nest for up to 41 days; the male fed the chick for up to 56 days. One captive female laid her first egg when 15 months old.

Movements. Permanent resident.

Status and Conservation. **VULNERABLE.** CITES II. No census data available. Although once common in suitable habitat in New Guinea, species is rapidly being extirpated near villages. Threatened by hunting for its plumes and for food, although there appears to be less pressure on this species than on its two congeners, e.g. in NW New Guinea shotguns are not so readily available; also threatened by logging activity, e.g. on Salawati. Residents of Batanta reckon the species has disappeared from the island. The single Seram record, Aug 1991, involved two birds collected by villagers for food, although local people described species as abundant in lowland forests on both Seram and nearby Bula I; very likely to have been introduced, as species is locally kept as pet or for food in New Guinea; not often hunted here, as considered difficult to catch and apt to perish rapidly in captivity. Despite being protected by law from both commercial trade and domestic use throughout New Guinea, the species continues to be traded, apparently in significant numbers, e.g. one handler based in Singapore reported having caught c. 900 birds in Irian Jaya; the genus is highly prized as an aviary bird; most are exported to European countries or to SE Asia, although all three

congeners are also offered for sale in W Europe. In period 1983-1988, total of 562 birds reported to CITES as having been exported, most from Taiwan, Singapore and Indonesia, but these figures are likely to be a significant underestimation of the scale of the trade. Protected under Papua New Guinea law, where Department of Environment and Conservation has proposed a number of initiatives, designed to protect all members of the genus, e.g. environmental education of local people and their involvement in conservation planning.

Bibliography. Andrew (1992), Beehler & Finch (1985), Beehler *et al.* (1986), Coates & Bishop (1997), Collar & Andrew (1988), Collar *et al.* (1994), Erritzoe (1993), Johnst & Johnst (1961), King & Nijboer (1994), Kitchener *et al.* (1993), Macdonald (1995), Mayr & Rand (1937), Mees (1965), Nicolai (1969), Peckover & Filewood (1976), Raethel (1980), Rand & Gilliard (1967), Rietkerk (1995), Ripley (1964), Rösler (1996), Rothschild *et al.* (1932), Rutgers & Norris (1970), Schönwetter (1963), Seth-Smith (1931).

184. Southern Crowned-pigeon

Goura scheepmakeri

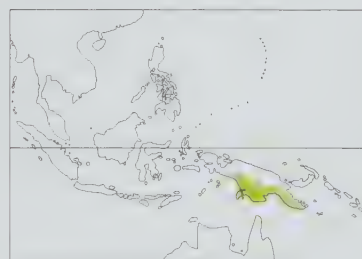
French: Goura de Scheepmaker **German:** Maronenbrust-Krontaube **Spanish:** Gura Sureña
Other common names: Maroon-breasted/Slater's/Scheepmaker's Crowned-pigeon, Great Goura

Taxonomy. *Goura scheepmakeri* Finsch, 1876, probably south New Guinea opposite Yule Island. Members of genus unique amongst pigeons in having no gallbladder; also lack oil-gland and have reticulate scaling on the strong, thick legs; 16 rectrices; they have no obvious close relatives. Present species probably more closely related to *G. cristata* than to *G. victoria*. Two subspecies recognized.

Subspecies and Distribution.

G. s. sclaterii Salvadori, 1876 - S New Guinea from R Mimika E to R Fly.

G. s. scheepmakeri Finsch, 1876 - S coast of SE New Guinea from Hall Sound and Mt Epa E to Orangerie Bay.



Descriptive notes. 71-79 cm; 2000-2235 g. Similar in appearance to *G. cristata* but breast and belly dark purple or maroon; mantle and lesser wing-coverts greyish blue, wing patch whitish grey; crest feathers longer and more lacy than in *G. cristata*; iris red; bill dark bluish grey; legs and feet purplish red. Sexes alike. Juvenile similar to that of *G. cristata* with creamy grey wing patch and maroon or purple of adults replaced by chestnut. Race *sclaterii* differs in having a white wing patch, lesser and median coverts maroon, and maroon breast becoming grey-blue on lower breast and belly.

Habitat. Inhabits both dry and flooded rain

forests in lowland and foothills, locally to 500 m.

Food and Feeding. Takes seeds, berries and fallen fruit, including those knocked to the ground by other species of pigeons; also feeds along muddy riverbanks, and has been observed feeding on small crabs. Highly terrestrial; parties of 3-7 birds are commonplace, and more rarely groups of 10-30 individuals have been observed.

Breeding. One bird flushed off nest in early Aug. Nest is solid, compact mass of sticks, palm fronds or coarse dead herbaceous leaves; placed 3.5-15 m above the ground. Lays 1 white egg. No further information available.

Movements. Sedentary. Tends to escape danger by running away, but if sufficiently alarmed, may fly and perch on limbs in middle storey, where easily shot.

Status and Conservation. **VULNERABLE.** CITES II. Threatened by logging and hunting activities. Formerly considered to be fairly common to common, but is now very rare anywhere near human settlements. As a large, easy and highly prized target for local hunters, species has been hunted to extinction throughout much of SE Papua New Guinea, and is now absent from perhaps all of S Trans-Fly; observed on lower reaches of R Fly in 1993 and remains locally common along tributaries of same river N of Kiunga. Still locally common in extensive lowland forests of S Irian Jaya, e.g. in undisturbed forests along R Biau, although even here it is shot indiscriminately by local people for food and plumes, and young birds captured and kept as pets. Species also occurs in sparsely populated forests of Gulf Province, although these, like other New Guinea forests, are unprotected by law and high on the list for proposed timber extraction. Like *G. cristata*, species is a prized aviary bird, although live export trade is apparently considerably less than in that species, e.g. total of 53 birds reported to CITES as having been exported over period 1983-1988. Protected from commercial trade and domestic use under Papua New Guinea and Irian Jaya law. Conservation efforts initiated by Papua New Guinea Department of Environment and Conservation, and designed to involve and educate local people in forest management, should benefit the species.

Bibliography. Andrew (1992), Anon. (1994a), Beehler & Finch (1985), Beehler, Burg *et al.* (1994), Beehler, Pratt & Zimmerman (1986), Burrows (1993), Coates (1985), Collar & Andrew (1988), Collar *et al.* (1994), Diamond (1972a), Erritzoe (1993), King & Nijboer (1994), Mayr & Rand (1937), Mees (1982a), Nicolai (1969), Peckover & Filewood (1976), Rand (1942a), Rand & Gilliard (1967), Rietkerk (1995), Rösler (1996), Schodde (1978).

185. Victoria Crowned-pigeon

Goura victoria

French: Goura de Victoria **German:** Fächertaube **Spanish:** Gura Victoria
Other common names: Victoria/White-tipped Goura, White-tipped Crowned-pigeon

Taxonomy. *Lophyrus Victoria* Fraser, 1844, islands in Geelvink Bay, New Guinea.

Members of genus unique amongst pigeons in having no gallbladder; also lack oil-gland and have reticulate scaling on the strong, thick legs; 16 rectrices; they have no obvious close relatives. Present species hybridizes with *G. cristata* along R Siriwo in NW New Guinea. Two subspecies recognized.

Subspecies and Distribution.

G. v. victoria (Fraser, 1844) - Yapen and Biak in Geelvink Bay.

G. v. beccarii Salvadori, 1876 - N New Guinea from R Siriwo E to Astrolobe and Collingwood Bays.

Descriptive notes. 66-74 cm; 2384 g. Immediately distinguishable from its two congeners by the crest feathers, which are broadly tipped with white, spatulate at the tips and less lacy than in the other two species, as the feather bars are only slightly separated; dark greyish blue in general coloration with a dark purplish red breast; wing patch pale greyish blue edged dark purple; iris red or purplish red; bill dark grey; legs and feet purplish red. Juvenile duller overall than adult, with purple parts of adults suffused brown; wing patch dull grey. Race *beccarii* slightly larger and paler.

Habitat. Occupies swamp and sago palm forests, as well as drier forests; found principally in lowlands, but sometimes, e.g. in Jimi Valley, may occur to 400-600 m.



Food and Feeding. Feeds on fallen fruit, berries and seeds; stomach contents of one bird contained marble-sized red berries. Forages on the forest floor; gregarious and may be seen in parties of 2-10 individuals.

Breeding. Virtually no data available on seasonality, but a juvenile, apparently c. 8 weeks old and not long out of the nest, was taken at Poe, NW New Guinea in Oct. Nest is neat, solid compact mass of palm and lawyer cane leaves, sticks and stems. Lays 1 white egg; incubation 30 days; fledging 4 weeks. In contrast to fledgling *G. cristata*, a young bird of present species did not return

to its nest to roost at night. A captive pair fed their fledgling until 13 weeks old. Courtship display first observed in a young male at 17 months old, suggesting that it had reached sexual maturity.

Movements. Sedentary. When flushed flies noisily up to nearby perches, 3-5 m above ground.

Status and Conservation. VULNERABLE. CITES II. As with its two congeners, threatened by logging, capture for trade, and hunting for food and plumes; its feathers are occasionally used by local people for head-dresses. Despite being protected by Papua New Guinea and Irian Jaya law, species is now absent from large areas of forest; and its strongholds in lowland forest are high on the list for logging. In 1950's species was still considered fairly common, except in vicinity of villages, in Middle Sepik region and at S base of Adelbert Mts, but was heavily hunted by both local people and Europeans. Only in the most remote areas is it still numerous, e.g. along R Rouffac, N New Guinea. As with congeners, species is highly sought after by aviary keepers, and significant numbers appear to be kept in SE Asian zoos and safari parks. In addition, trade is probably also significant, with 65 birds being reported to CITES as having been exported during 1983-1988, with more than 50% of these leaving Singapore.

Bibliography. Andrew (1992). Beehler & Finch (1985). Beehler *et al.* (1986). Coates (1985). Collar & Andrew (1988). Collar *et al.* (1994). Diamond (1972a), Erritzoe (1993). Fleay (1961). Gilliard & LeCroy (1966, 1967b). King & Nijboer (1994). Majnep & Bulmer (1977). Mayr & Berlioz (1933). Mayr & Meyer de Schauensee (1939b). Nicolai (1969). Peckover & Filewood (1976). Rand & Gilliard (1967). Rietkerk (1995). Ripley (1964). Rösler (1996). Rutgers & Norris (1970). Wiseman (1996).

inches 5
cm 13

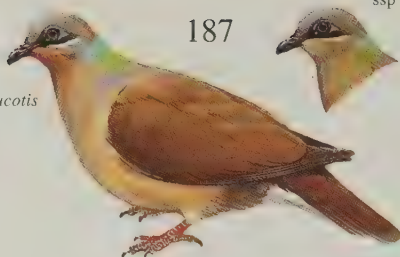
PLATE 17

186



ssp leucotis

187



ssp nigrorum

ssp amethystina

188



ssp cinereiceps

ssp maculipectus

ssp brunneiceps

189



♂
ssp fulvicollis



190



ssp baramensis

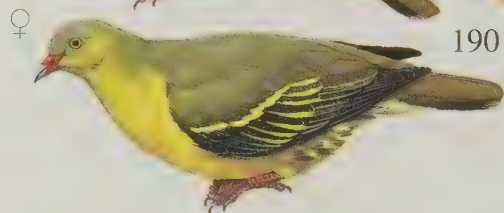
♂



191

♀

♂

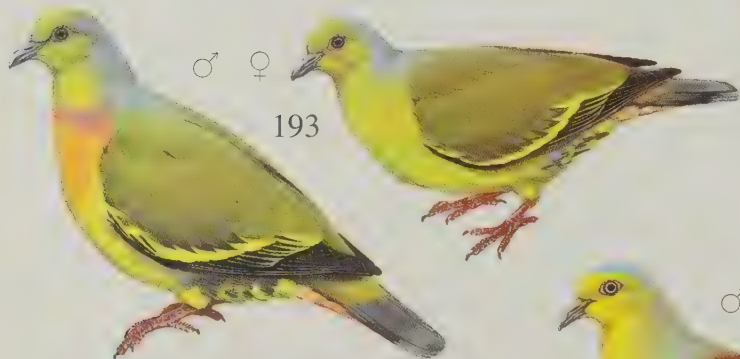


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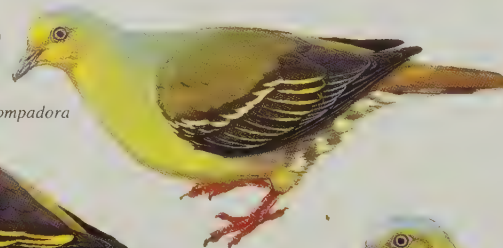
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ssp pompadora

192

♂

♀



♂



♂

ssp canescens

ssp phayrei

194



ssp axillaris

♂



♂

ssp aromatica



♂

ssp chloroptera

ssp everetti

♂

Subfamily DIDUNCULINAE

Genus *DIDUNCULUS* Peale, 1848

186. Tooth-billed Pigeon

Didunculus strigirostris

French: Diduncule strigirostre **German:** Zahntaube **Spanish:** Paloma Manumea

Taxonomy. *Gnathodon strigirostris* Jardine, 1845, Australia; error = Upolu, Samoa.
Very distinctive genus of uncertain affinities, perhaps most closely allied to *Gallicolumba*; some early workers placed the species in its own family, Didunculidae. Single species survives, although a larger, extinct member of the genus has been found in cave deposits on 'Eua (S Tonga). Monotypic.
Distribution. Upolu and Savaii in Western Samoa.



Descriptive notes. 31-38 cm; 400 g. Robust, with a short tail; unique bill stout and curved, with two notches and three projections in either side of lower mandible, yellow, red at base; head, neck, breast and mantle glossy blackish green; back and wings chestnut; orbital skin, legs and feet red. Female similar but with less iridescence. Juvenile has dark bill; dark edges to feathers, giving freckled appearance.

Habitat. Found in both primary and secondary native forest, but nowadays apparently almost exclusively restricted to mid-elevation forests above 300 m; absent from cloud forest. Does not adapt to areas replanted with exotic species.

Food and Feeding. Reported to be partial to wild plantains and to aerial tubers of wild yam *Dioscorea bulbifera*; also seeds of wild mahogany (*Dysoxylum*, Meliaceae), which are contained in a tough capsule that the species is able to open using its strong bill; also reported to feed on a variety of other fruits, including *Rhus* (Anacardiaceae) and *Myristica* (Myristicaceae). A specimen in captivity was observed to hold down stale bread in its feet while tearing it with its bill. Feeds in trees from the understorey to canopy; reports of ground feeding need verification.

Breeding. Virtually nothing known. Nest reported to be well hidden in thick foliage about 5-12 m above the ground, though no detailed descriptions have been published.

Movements. No information on movements. Flies strongly when flushed from the ground, rising with loudly clapping wings, and ending with a long glide; flies below the canopy.

Status and Conservation. **VULNERABLE.** Population estimated to be 5000-7000 birds in mid-1980's, but this may have been an overoptimistic reckoning. By 1993 the bird was extremely rare on Upolu and in lowlands of Savaii; no recent survey of the montane forests of Savaii, which may be the species' last stronghold; however, much of this area is above the range of the food plants reported to be most favoured by the species. Threatened by habitat destruction as a result of human activity, cyclones and feral pigs; hunting is also a threat. Species has been granted full legal protection, but is probably still taken by hunters in pursuit of unprotected pigeon species.

Bibliography. Armstrong (1932), Beichle (1982, 1987, 1989, 1991a, 1991b), Beichle & Maelzer (1985), Bennett (1864), Blockstein (1988a), Burton (1974), Collar & Andrew (1988), Collar *et al.* (1994), Dahl (1986), DuPont (1972c, 1976), Étiénné (1976), Hay (1986), King (1978/79), Kingdon (1989), Mayr (1945b), Muse & Muse (1982), Pratt *et al.* (1987), Ramsey (1864), Reed (1980b), Stair (1897), Steadman (1993, 1995), Watling (1982a), Yaldwyn (1952).

Subfamily TRERONINAE

Genus *PHAPITRERON* Bonaparte, 1854

187. White-eared Brown-dove

Phapitreron leucotis

French: Phapitréron à oreillons blancs **German:** Ohrstreiftaube **Spanish:** Vinago Pardo Común
Other common names: Lesser Brown Fruit-dove, Brown/White-eared Fruit-pigeon

Taxonomy. *Columba leucotis* Temminck, 1823, Manila, Luzon, Philippine Islands.
Genus apparently has no close relatives; restricted to Philippines. Four subspecies recognized.

Subspecies and Distribution.

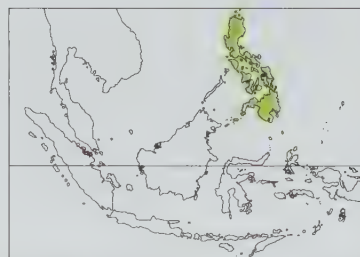
P. l. leucotis (Temminck, 1823) - N Philippines, on Luzon, Polillo, Alabat, Catanduanes, Lubang, Verde, Mindoro and Marinduque.

P. l. nigrorum (Sharpe, 1877) - CE Philippines, on Ticao, Tablas, Sibuyan, Masbate, Panay, Calaguan, Guimaras, Negros and Cebu.

P. l. brevirostris (Tweeddale, 1877) - SE Philippines, on Samar, Calicoan, Biliran, Leyte, Bohol, Siquijor, Camiguin Sur, Dinagat, Siargao and Mindanao.

P. l. occipitalis (Salvadori, 1893) - S Philippines, on Basilan and Sulu Is.

Descriptive notes. 24 cm; 89-136 g. Forehead grey becoming vinous brown on crown and nape; rest of plumage brown, paler below, throat rufescent; neck and mantle glossy bronze-green and purple; central rectrices dark purple-brown, tipped dull grey; outer rectrices with pale tips and brown dark purplish subterminal band; undertail-coverts pale grey; black stripe and below a white stripe run from the bill passing below the eye toward the nape; iris colour varies with subspecies; pink, brown, purplish or grey with a narrow outer ring of white or pale blue; orbital skin bluish



green; feet or legs pink or red; bill black. Sexes similar. Juvenile paler and redder, wing feathers fringed with rust; little or no neck iridescence; facial markings less pronounced than in adult. Race *nigrorum* has buff ear-stripes, with chin paler than in nominate; *brevirostris* has darker upperparts than previous race, with stronger gloss on mantle; *occipitalis* has slightly darker throat than previous race, and red-bronze nape.

Habitat. Inhabits dense woodland, open woodland and edges of cultivated fields up to 1500 m.

Food and Feeding. Takes fruit from trees but also eats some seeds.

Breeding. Recorded Mar-Jun. Typical pigeon nest placed in a tree, often constructed of tendrils. Lays 2 eggs.

Movements. Resident.

Status and Conservation. Not globally threatened. Very little information available on status, but species is still considered common on most islands throughout its range; apparently adaptable, at least to some extent, to certain environments modified by man. Extensive research required.

Bibliography. Brooks, Dutson *et al.* (1996), Danielsen *et al.* (1994), Delacour & Mayr (1946), Dickinson, Kennedy & Parkes (1991), Dickinson, Kennedy, Read & Rozendaal (1989), DuPont (1971), DuPont & Rabor (1973b), Evans, Dutson & Brooks (1993), Gonzales (1983), Gonzales & Rees (1988), Goodman & Gonzales (1990), Hachisuka (1932), Landolt (1987), Manuel (1936a), McClure (1974), McGregor (1909-1910), Potter (1953), Rabor (1977), Rand & Rabor (1960), Robson & Davidson (1996), Salvadori (1893), Wolfe (1938).

188. Amethyst Brown-dove

Phapitreron amethystina

French: Phapitréron améthyste **German:** Amethysttaube **Spanish:** Vinago Pardo Amatista
Other common names: Amethyst/White-eared(!)/Greater (Brown) Fruit-dove, Amethystine Brown-dove

Taxonomy. *Phapitreron amethystina* Bonaparte, 1855, Philippines.

Genus apparently has no close relatives; restricted to Philippines. Present species sometimes considered conspecific with *P. cinereiceps*, but the two have been found to exist sympatrically on E slope of Mt McKinley, Mindanao. Four subspecies recognized.

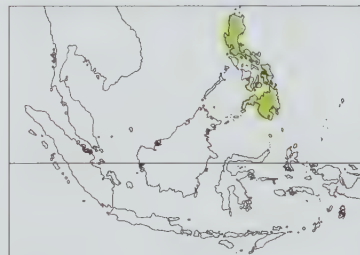
Subspecies and Distribution.

P. a. amethystina Bonaparte, 1855 - N, E & SE Philippines, on Luzon, Polillo, Alabat, Catanduanes, Samar, Leyte, Bohol, Panaon, Dinagat and Mindanao.

P. a. imeldae De La Paz, 1976 - NC Philippines, on Marinduque.

P. a. maculipectus Bourns & Worcester, 1894 - EC Philippines, on Negros.

P. a. frontalis Bourns & Worcester, 1894 - EC Philippines, on Cebu (possibly extinct).



Descriptive notes. 27 cm; 112-149 g. Slightly larger than *P. leucotis*, with slightly longer bill; also darker, with iridescence of neck violet blue and purple; undertail-coverts reddish buff; iris varies from yellow to golden brown to reddish; orbital skin pink to red, sometimes bluish; feet red; bill black. Sexes similar. Juvenile paler with much reduced neck gloss; coverts and secondaries edged reddish fawn, facial markings less conspicuous than adult. Races differ in coloration; *maculipectus* very pale below; *frontalis* has grey undertail-coverts tipped chestnut.

Habitat. Inhabits forest interior, occupying humid forest and dense secondary growth, at

altitude range of c. 1000-2500 m.

Food and Feeding. Takes fruit and seeds; further details lacking.

Breeding. Males with enlarged testes have been taken in Feb, May and Jun; 1 bird carrying a large twig noted on Bohol in mid-Apr. Nest and eggs undescribed.

Movements. Resident.

Status and Conservation. Not globally threatened. Very few data on status and no population estimates available. Species generally considered uncommon to rare throughout its range. Race *maculipectus* considered to be within immediate danger of extinction, should timber extraction continue at the current rate. No recent records from Cebu, where race *frontalis* may well be extinct now.

Bibliography. Brooks, Dutson *et al.* (1996), Brooks, Evans *et al.* (1992), Brooks, Magsalay *et al.* (1995), Danielsen *et al.* (1994), De La Paz (1976), Delacour & Mayr (1946), Dickinson *et al.* (1991), DuPont (1971), Evans, Dutson & Brooks (1993), Gonzales (1983), Goodman & Gonzales (1990), Hachisuka (1930, 1932), Landolt (1987), Manuel (1936a), McGregor (1907, 1909-1910), Rand & Rabor (1960), Ripley & Rabor (1956), Robson & Davidson (1996).

189. Dark-eared Brown-dove

Phapitreron cinereiceps

French: Phapitréron à oreillons bruns **Spanish:** Vinago Pardo de Tawitawi
German: Dunkelohrtaube
Other common names: Southern Brown Fruit-dove

Taxonomy. *Phabotreron cinereiceps* Bourns and Worcester, 1894, Tawitawi.

Genus apparently has no close relatives; restricted to Philippines. Present species sometimes considered conspecific with *P. amethystina*, but the two have been found to exist sympatrically on E slope of Mt McKinley, Mindanao. Two subspecies recognized.

Subspecies and Distribution.

P. c. brunneiceps (Bourns & Worcester, 1894) - SE Philippines, on Mindanao (Bukidnon Province and Mts Malindang, Hilong Hilong, McKinley and Mayo) and Basilan.

P. c. cinereiceps (Bourns & Worcester, 1894) - S Philippines, on Tawitawi.



Descriptive notes. 27 cm; 131-159 g. Differs from congeners in lacking white ear-stripe; underparts with more vinaceous tinge, throat and breast rufous, belly brown, undertail-coverts greyish; hindneck has redder gloss. Sexes similar. Race *brunneiceps* has redder hindneck.

Habitat. Humid forests and dense second growth on islands of Mindanao, Basilan and Tawitawi at altitude range of c. 1000-2000 m.

Food and Feeding. Probably fruit and seeds.

Breeding. A nest with 2 young found on Basilan in Apr.

Movements. No information.

Status and Conservation. **VULNERABLE.**

Uncontrolled hunting presents a problem on Tawitawi, although much apparently suitable forest remains there. Habitat loss is a major concern on Mindanao, where species appears to have become very rare; in recent years there has been just a single confirmed sighting, at 1100 m in mid-montane forest at L Sebu, S Cotabato Province, in 1992. Surveys needed in order to establish current status, and conservation requirements.

Bibliography. Collar *et al.* (1994), Delacour & Mayr (1946), Dickinson *et al.* (1991), DuPont (1971), Dutson *et al.* (1996), Evans, Dutson & Brooks (1993), Kuroda (1927), Manuel (1936a), McGregor (1909-1910), Rand & Rabor (1952, 1960).

Genus *TRERON* Vieillot, 1816

190. Cinnamon-headed Green-pigeon

Treron fulvicollis

French: Colombar à cou roux **German:** Zimtkopf-Grüntaube **Spanish:** Vinago Cabecirrufo

Other common names: Chestnut-headed/Cinnamon Green-pigeon, Cinnamon-headed Pigeon

Taxonomy. *Columba fulvicollis* Wagler, 1827, Java; error = Sumatra.

A distinctive form of uncertain affinities. Four subspecies recognized.

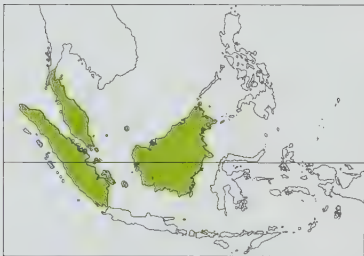
Subspecies and Distribution.

T. f. fulvicollis (Wagler, 1827) - lowlands of Malay Peninsula S to Sumatra (including Riau and Lingga Archipelagos, Bangka, Belitung, Siberut).

T. f. melopogenys (Oberholser, 1912) - Nias I (off W Sumatra).

T. f. oberholseri Chasen, 1934 - Natuna Is (off NW Borneo).

T. f. baramensis A. B. Meyer, 1891 - Borneo and N Bornean islands.



Descriptive notes. 25-27 cm; 167 g. Head and neck rusty purplish chestnut becoming dark greenish gold on breast and dark reddish purple on mantle and lesser wing-coverts; belly dull yellowish green becoming grey to greenish on flanks; tibial feathers pale yellow with dark green tips; undertail-coverts light chestnut; wing-coverts, secondaries and primaries black with bright yellow fringes; inner secondaries, rump and central rectrices olive-green; outer rectrices greenish grey with black subterminal and pale grey terminal bar; orbital skin greyish or bluish green; bill white tinged bluish green, base dark red; feet purplish pink.

claws white. Female has chestnut areas replaced by dark olive green above and yellowish green on breast; forehead and crown grey, undertail-coverts white or cream marked with green. Juvenile similar to female. Races *oberholseri* and *melopogenys* very similar to nominate; *baramensis* differs in purplish chestnut breast in male, with belly grey, only slightly tinged green.

Habitat. Coastal swamps and forest, open scrub and mangroves up to 200 m.

Food and Feeding. Known to be frugivorous, but no detailed information on diet. Reported to feed primarily in small trees.

Breeding. In Sumatra, eggs collected in Feb-Apr; in Borneo, nest building in Feb; in Peninsular Malaysia, nests recorded in Jan-Feb and May-Jun. Builds typical pigeon nest of live twigs, in a shrub or small tree; one nest was almost entirely hidden in dead fern stalks c. 5 m above ground; both adults share in nest building duties. Lays 2 white eggs.

Movements. Little known. Presumed to be resident in Thailand, Sumatra and Nias; no evidence of nocturnal migration from the Fraser's Hill watchpoint in Peninsular Malaysia.

Status and Conservation. Not globally threatened. Currently considered near-threatened. Reckoned to be generally uncommon. No recent records from S Thailand, where species may always have been a rare resident. Reported to be commoner in C & S Borneo than elsewhere in Greater Sundas; frequently recorded in Way Kambas National Park (Sumatra) and in Sepilok Reserve, Sabah (NE Borneo).

Bibliography. Dymond (1994), Lekagul & Round (1991), MacKinnon & Phillips (1993), Madoc (1976), van Marle & Voous (1988), Medway & Wells (1976), Nash & Nash (1988), Rajathurai (1996), Robinson & Chasen (1936), Robson (1996d), Round (1988), Smythies (1981), Wells (1990).

191. Little Green-pigeon

Treron olax

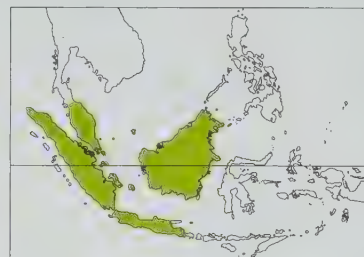
French: Colombar odorifère **German:** Graukopf-Grüntaube **Spanish:** Vinago Chico

Taxonomy. *Columba olax* Temminck, 1823, Sumatra.

Affinities uncertain, but may be allied with the *T. bicipincta-T. vernans* group, or perhaps with *T. fulvicollis*. Monotypic.

Distribution. Peninsular Thailand and Malaysia through Sumatra (including Riau and Lingga Archipelagos, Belitung and Bangka) to Borneo (including Natuna Is) and Java.

Descriptive notes. 21-22 cm; 77 g. Plump, compact and short-tailed; the smallest *Treron*. Head, upper half of neck and hindneck dark blue-grey becoming pale blue-grey on forehead and chin;



breast dark orange-gold becoming yellow-green on lower breast and belly; flanks grey; tibial feathers chestnut and grey; long undertail-coverts dark chestnut; mantle and lesser inner wing-coverts dark reddish purple; rest of wing black with narrow pale yellow edges to greater-coverts and secondaries; underwing, rump and uppertail-coverts grey; rectrices greyish black with narrow pale grey terminal band (faint in central pair); orbital skin light blue or greenish blue; bill whitish, pale green or greenish yellow with light blue or blue-green base and cere; feet red or purplish red. Female has no purple, orange or

chestnut in plumage; dark olive-green above and yellowish green below, with grey forehead and crown, buff and dark green vent and buff undertail-coverts. Juvenile is much like adult female, but juvenile male has chestnut fringes to inner wing-coverts and scapulars.

Habitat. Forests, parks, gardens and second growth up to 1400 m. May be most common in lowland and foothill forest.

Food and Feeding. Frugivorous; known to feed on wild figs, but no further details available on diet. Typically seen in small flocks of up to 8 birds; feeds from middle storey to canopy.

Breeding. Little information available. Recorded in Feb in S Borneo; Apr and Jun in Sumatra; and Jun in Borneo. Builds flimsy nest of live twigs, typical of the genus; male is principal nest-builder. Usually 2 white eggs.

Movements. Nocturnal migration has been recorded from watchpoint on Fraser's Hill, Malaysia, with records during Apr-May, Aug-Sept and Nov in late 1960's.

Status and Conservation. Not globally threatened. Few precise details available, but species described as being locally common in Sumatra and Borneo; very rare in lowland forests of W Java. No breeding records from Java.

Bibliography. Davison (1995), Hellebrekers & Hoogerwerf (1967), Holmes (1994a), Holmes & Burton (1987), Lekagul & Round (1991), MacKinnon (1988), MacKinnon & Phillips (1993), Madoc (1976), van Marle & Voous (1988), Medway & Wells (1976), Meyer de Schauensee & Ripley (1940), Nash & Nash (1988), Robinson & Chasen (1936), Round (1988), Smythies (1981, 1986), Wilkinson, Dutson & Sheldon (1991).

192. Pink-necked Green-pigeon

Treron vernans

French: Colombar giouanne **German:** Frühlingsstaube

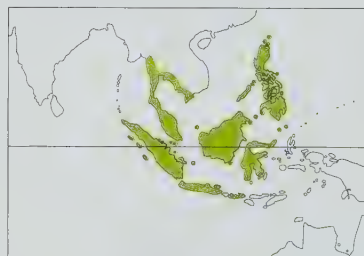
Spanish: Vinago Cuellirrosa

Other common names: Pink-necked Pigeon

Taxonomy. *Columba vernans* Linnaeus, 1771, Philippines.

Most closely related to *T. bicipincta*. Many subspecies described, but variation appears to be minor and essentially clinal; largely research required. Monotypic.

Distribution. S Myanmar (S Tenasserim), S Thailand, Cambodia and S Vietnam (S Annam, Cochinchina) through Peninsular Malaysia to Sumatra (and most surrounding islands), Borneo (including Anambas and Natuna Is), Sulawesi and several offshore islands, Philippines, Java, Lombok and Sumbawa.



Descriptive notes. 23.5-28 cm; 105-160 g. Head and middle area of hindneck and mantle light bluish grey, more or less suffused pale green on cheeks and throat, and with vinous pink on the hindneck; sides of neck and breast, and band across upper breast delicate mauve-pink; lower breast (except at sides) bright tawny orange; underparts yellowish green becoming yellow on vent; flanks grey-green, with some feathers edged yellow; back and wing-coverts bright olive-green with yellow edges to some feathers; wing quills and some outer coverts black; central rectrices mainly blue-grey, others blue-grey with broad black

subterminal bands and narrow grey tips; uppertail-coverts with tawny fringes; long undertail-coverts chestnut; bill white, grey or pale blue-green with yellow or greener base; legs and feet pink, purple or reddish. Female mainly dark olive green above and yellowish green below, lacking pink, orange and grey of male; undertail-coverts paler than male and broadly edged pale yellowish; chestnut areas paler and suffused with green. Juvenile similar to female but greyer green above and with buff or yellow fringes to many feathers.

Habitat. Forest and forest edge, plantations, bamboo and mangroves. Most often in coastal lowlands, but reported up to 300 m in Philippines, to 900 m in the Greater Sundas, and 1200 m in NC Sulawesi. Forms communal roosts, often on mangrove-fringed islands. In Sulawesi, often associates with *T. griseicauda*.

Food and Feeding. Frugivorous; diet reported to include figs (Moraceae) and *Melastoma* (Melastomataceae), as well as tips of shrubs and shoots. Feeds from middle storey to canopy level; usually seen in small flocks, but may congregate in larger numbers of up to 70 birds at good feeding areas.

Breeding. Nests reported all year round, except Feb, in Greater Sundas: Mar-Apr on Palawan; Apr-May on Negros and Cebu; nestlings in Dec on Mindanao; occupied nests in Nov-Aug in Malaysia; breeding reported in Mar-May on Sumbawa and Lombok. Nest is a flimsy platform of twigs, often quite low down in a tree or shrub; nest recorded in coconut palm in Borneo; male may be principal nest-builder. Lays 2 white eggs.

Movements. Considered resident on Sumatra and no nocturnal records from the Fraser's Hill watchpoint, Malaysia, during late 1960's. Two recent (1988 and 1992) records from Halmahera may represent a range expansion, perhaps from NE Sulawesi.

Status and Conservation. Not globally threatened. Common throughout much of its range, especially in lowlands in Greater Sundas; shows itself to be adapting to second growth and other human-modified habitats. Abundant in many parts of Sumatra (e.g. N Riau) and very common in coastal areas on Nias I; also very common in Singapore, especially in Water Catchment Area, but also in city gardens with large trees. Suffers considerable hunting pressure in Sumatra, but for the present, at least, would seem capable of withstanding such pressure.

Bibliography. Bishop (1992), Bucknill & Chasen (1990), Coates & Bishop (1997), Deignan (1945), Delacour & Mayr (1946), Dickinson *et al.* (1991), Hellebrekers & Hoogerwerf (1967), Holmes & van Balen (1996), Holmes & Burton (1987), Lekagul & Round (1991), MacKinnon (1988), MacKinnon & Phillips (1993), Madoc (1976), van Marle & Voous (1988), Medway & Wells (1976), Mees (1996), Meyer de Schauensee & Ripley (1940), Rabor

(1977), Rand & Rabor (1960), Robinson & Chasen (1936), Round (1988), Rutgers & Norris (1970), Smythies (1981, 1986), Thiollay (1995), Ward (1968), White & Bruce (1986), Whitten *et al.* (1987).

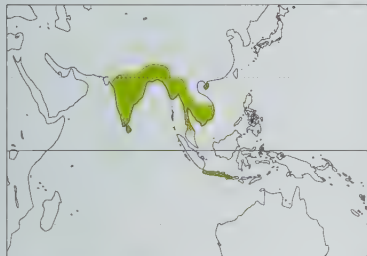
193. Orange-breasted Green-pigeon

Treron bicincta

French: Colombar à double collier **German:** Bindengrüntaube **Spanish:** Vinago Bicinta
Other common names: Orange-breasted Pigeon

Taxonomy. *Vinago bicincta* Jerdon, 1840, coast south of Tellicherry, India. Most closely allied to *T. vernans*. Validity of races requires verification. Four subspecies tentatively recognized.

Subspecies and Distribution.
T. b. leggei Hartert, 1910 - Sri Lanka.
T. b. bicincta (Jerdon, 1840) - Indian Subcontinent (Himalayan foothills of Uttar Pradesh S to Western Ghats and Kerala, and E to Assam) through Myanmar and Thailand (except C) to S Laos, S & C Vietnam and N Malaysia.
T. b. domvili (Swinhoe, 1870) - Hainan I.
T. b. javana Robinson & Kloss, 1923 - Java and Bali.



Descriptive notes. 29 cm; 155-194 g. Similar to *T. vernans*, but slightly larger and heavier-billed; forehead, face and throat greenish yellow, and mauve-pink area on upper breast smaller and does not extend to neck; tail pattern different, outer rectrices blackish with a broad pale grey subterminal band. Female differs from female *T. vernans* in having grey nape and hindneck; tail pattern as in male. Races differ only slightly in size and coloration.
Habitat. Forest, second growth and plantations. Primarily in coastal regions, probably including mangroves, and lowlands, but up to 1500 m in Himalayan foothills, where reported

to be common in *terai*.
Food and Feeding. Feeds on a variety of fruits and berries, including figs, guavas, banyan, cinnamon berries, lantana berries and wild palm fruit. Will sometimes feed in orchards; typically encountered in flocks and occasionally forms mixed-species flocks with *T. vernans*.
Breeding. In India, reported Mar-Sept, with peak Apr-Jun; in Sri Lanka, all year round, with peak in Dec; only nesting records in Java are for Mar; dependent immatures seen on Bali in May. Nest is a frail platform of twigs, placed in a tree or shrub, 2-8 m up; often near a clearing, path or other opening in the forest. Lays 2 white eggs; both parents share in nest building and incubation; incubation c. 12-14 days.
Movements. Resident, with local seasonal movements in response to food availability. No nocturnal records from Fraser's Hill watchpoint, Malaysia, in late 1960's.
Status and Conservation. Not globally threatened. Race *javana* has declined and is now considered rare; indeed, species only rediscovered on Java in 1988, where it is apparently the commonest green-pigeon in Baluran National Park (E Java). First found in Bali in Apr 1989, when it was located in Bali Barat National Park; fairly common within this park in 1995.
Bibliography. Ali (1996), Ali & Ripley (1981), Baker (1913), van Balen (1991), Eates (1938), Éthécopar & Hùe (1978), Hellebrekers & Hoogerwerf (1967), Henry (1971), Inskipp & Inskipp (1991, 1993), Lekagul & Round (1991), MacKinnon (1988), MacKinnon & Philipps (1993), Majumdar *et al.* (1992), Medway & Wells (1976), Phillips (1978), Round (1988), Saha & Dasgupta (1992), Smythies (1986), Stepanyan (1995), Wells (1990).

194. Pompadour Green-pigeon

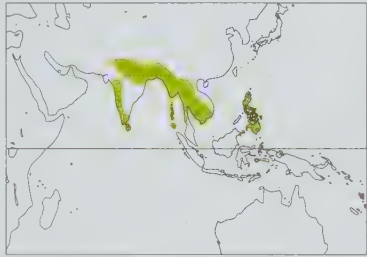
Treron pompadora

French: Colombar pompadour **German:** Pompadourtaube **Spanish:** Vinago de Pompadour
Other common names: Grey-fronted/Ashy-headed/Andaman Green-pigeon; Pompadour Pigeon

Taxonomy. *Columba Pompadora* J. F. Gmelin, 1789, Sri Lanka.

Closely related to *T. curvirostra*; these two species are associated, and both have large number of island forms; species limits in this whole complex have been discussed by a number of authorities, but remain uncertain; present species has at times been considered to include any or all of *T. griseicauda*, *T. floris*, *T. teysmannii* and *T. psittacea* as races. Races *chloroptera*, *axillaris* and *aromatica* sometimes considered megasubspecies. Numerous other races have been described, many based on minor differences. Eight subspecies currently recognized.

Subspecies and Distribution.
T. p. pompadora (J. F. Gmelin, 1789) - Indian Subcontinent (Himalayan foothills of Uttar Pradesh S to Western Ghats and Kerala, and E to Assam) and Sri Lanka.
T. p. chloroptera Blyth, 1846 - Andaman and Nicobar Is.
T. p. phayrei (Blyth, 1862) - Myanmar through SW China (S Yunnan) and Thailand to Laos and S Vietnam (Cochinchina).
T. p. amadoni Parkes, 1965 - N Luzon (N Philippines).
T. p. axillaris (Bonaparte, 1855) - S Luzon, Polillo, Alabat, Catanduanes, Lubang and Mindoro (N Philippines).
T. p. canescens Parkes, 1965 - Mandate S to Mindanao and Basilan (E Philippines).
T. p. everetti (Rothschild, 1894) - Sulu Archipelago.
T. p. aromatica (J. F. Gmelin, 1789) - islands in Flores Sea (Tanahjampea, Kalao, Kalaotoa) and S Moluccas (Buru).



Descriptive notes. 27-28 cm; 115-200 g. Fore-head, face and throat bright yellow-green becoming pale soft green on breast and belly, and greyish green on hindneck; crown bluish grey; mantle, scapulars and lesser wing-coverts dark purplish chestnut; rest of wing black, with yellow edges to median and greater coverts and secondaries; rump and central rectrices yellowish olive green; outer rectrices dark grey washed olive at base, with blackish central band and broad pale grey terminal band; undertail-coverts whitish marked grey-green; eye-rims green; bill bluish grey or pale grey, greenish at base; legs and feet red or purplish red. Female olive green where male is purplish chestnut. Juvenile very similar to adult female. Race *chloroptera* has rump bright yellow-green, and wing-coverts olive green in both sexes, the purplish chestnut in male confined to mantle and scapulars; *aromatica* has brighter and yellower green areas, most of lesser wing-coverts dark grey, with well marked grey band across upper back, and yellow edges to coverts and secondaries particularly well developed; *axillaris* has undertail-coverts almost all white, and red base to bill.

Habitat. Primary and secondary forests, from sea-level up to c. 1500 m, though usually below 1000 m. Found in coastal zone less frequently than *T. bicincta*.
Food and Feeding. Frugivorous, taking a variety of fruits, drupes and berries, and also reported to feed on termites; figs (Moraceae) and *Zizyphus* (Rhamnaceae) reported to be important. Sometimes forages on the ground for wild strawberries; typically seen in small flocks of 12 or more birds, but may congregate in large flocks at abundant food sources or roosts. Visits salt-licks.
Breeding. Extended season varies across extensive range, e.g. Dec-Mar in India, mainly Dec-Jun in Sri Lanka, and May-Jun in Philippines. Nest is a flimsy platform of twigs in a moderate-sized tree, usually less than 4 m up; often quite exposed; sexes share nest building. Lays 2 white eggs; incubation 12-14 days, by both sexes.
Movements. Resident, with some local and altitudinal movements governed by food availability. Flight swift and direct, sometimes with sharp twists and abrupt turns when frightened.
Status and Conservation. Not globally threatened. Few precise details available, but species considered to be common throughout much of its extensive range; common in Andamans and Nicobars, and also in Sri Lanka; fairly common in Philippines; moderately common on Buru; however, in Thailand, now uncommon or even rare, its numbers having been much reduced.
Bibliography. Abdulali (1935), Ali (1996), Ali & Ripley (1981), Alonzo-Pascicolan (1992), Baker (1913), Coates & Bishop (1997), Crosby (1995b), Deignan (1945), Dickinson *et al.* (1991), Frend (1948), Goodman & Gonzales (1990), Husain (1958), Inskipp & Inskipp (1991), Jepson (1993), Lekagul & Round (1991), Majumdar *et al.* (1992), Mayr (1944b), Phillips (1978), Phythian-Adams (1943), Rabor (1977), Rand & Fleming (1953), Rand & Rabor (1960), Round (1988), Rutgers & Norris (1970), Saha & Dasgupta (1992), Smythies (1986), Tikader (1984), White & Bruce (1986), Yang Lan *et al.* (1995).

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cm 13

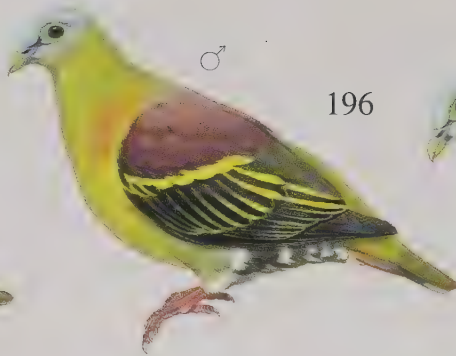
PLATE 18



195



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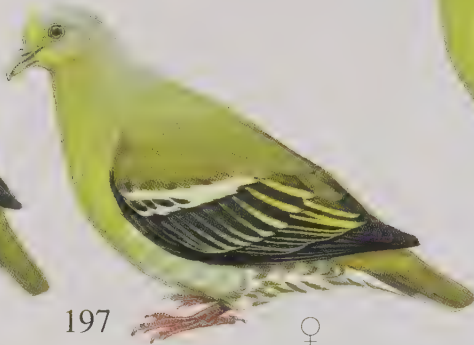
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200



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ssp phoenicoptera



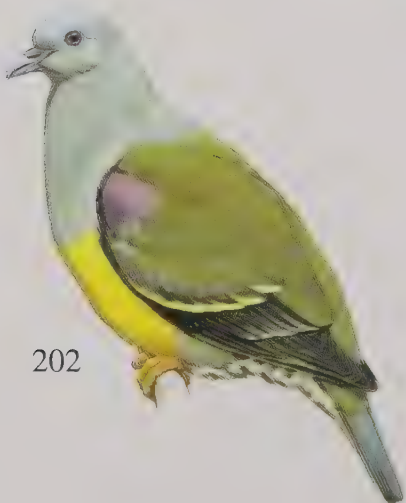
ssp viridifrons

201



ssp chlorigaster

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ssp annamensis

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ssp australis

ssp griveaudi

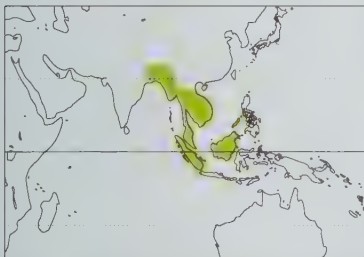
195. Thick-billed Green-pigeon

Treron curvirostra

French: Colombar à gros bec **German:** Papageischnabeltaube **Spanish:** Vinago Piquigrueso
Other common names: Thick-billed Pigeon

Taxonomy. *Columba curvirostra* J. F. Gmelin, 1789, Tanna Island, Vanuatu; error = Rawang, Selangor, Malaysia. Closely related to *T. pompadora*; these two species are associated, and both have large number of island forms; species limits in this complex have been discussed by a number of authorities, but remain uncertain; present species possibly best considered as forming a superspecies with *T. griseicauda*, *T. floris*, *T. teysmannii* and *T. psittacea*, though all four have been considered conspecific with present species or, rarely, with *T. pompadora*. Numerous races have been described, based on minor differences of questionable significance. Monotypic.

Distribution. Nepal, NE India (E to Arunachal Pradesh, S to Mizoram, Manipur, Nagaland) and Bangladesh to S China (W Yunnan, Hainan) S through Indochina and Malay Peninsula to Sumatra and surrounding islands, Deli I (S of W Java), Borneo and W Philippines (Mindoro, Palawan, Balabac).



Descriptive notes. 24-31 cm; 112-186 g. Fore-head and crown blue-grey; face, throat, neck, underparts, rump and central rectrices light green tinged gold on rump, central rectrices and breast, and tinged grey on hindneck and belly; flanks, tibial feathers and shorter undertail-coverts dark green broadly tipped white giving spotted effect; long undertail-coverts pale chestnut; mantle and lesser wing-coverts dark purplish maroon; rest of wings dark green or black with broad yellow edges to most feathers, forming conspicuous yellow stripes on closed wing; outer rectrices dark grey at base, pale grey at tips with black central band; orbital skin bright or bluish green; bill pale green, yellowish or whitish, with red patch at side of base; feet and legs red. Female has dark or olive green on back where male is purplish maroon; undertail-coverts green and white, sometimes with chestnut tinges. Juvenile like adult female but duller and greyer with yellowish fringes to most coverts.

Habitat. Occurs in variety of forest types, including evergreen, mixed deciduous, and mangroves, as well as second growth; ranges from lowlands up to c. 1500 m; less often in open country than many other *Treron* species, although is reported to feed on grain crops at times.

Food and Feeding. Frugivorous, reported to be especially attracted to figs (Moraceae). Typically feeds in trees, from shrub layer to canopy, normally in flocks of 10-40 birds; sometimes forages on the ground for wild strawberries and other ground plants. Also reported to feed on rice and millet.

Breeding. Season late Mar to Aug in NE India, with peak in May; nest building in Jan on Sumatra; nests with eggs found in Malaysia in Jan, late Feb and Jun. Nest is a slight platform of twigs placed on forked leafy branch of a small tree or in bamboo; sexes share nest building; sometimes 2-3 nests located within a few metres of each other. Lays 2 white eggs; incubation c. 14 days, by both sexes.

Movements. Generally resident, with seasonal local movements in response to fruit availability. One of three commonest pigeon species recorded on nocturnal flights at Fraser's Hill watchpoint, Malaysia.

Status and Conservation. Not globally threatened. Few precise details available, but species considered to be common throughout much of its extensive range; in Thailand, considered to be the commonest green-pigeon of wooded habitats inland; common in Sumatra and surrounding islands, Peninsular Malaysia, and also in Philippines. Listed as endangered in Singapore.

Bibliography. Ali & Ripley (1981), Baker (1913), Deignan (1945), Dickinson *et al.* (1991), Échécopar & Hùe (1978), Holmes & Burton (1987), Husain (1958), Inskipp & Inskipp (1991), Joseph, C.A.N. (1984), Lekagul & Round (1991), MacKinnon & Phillips (1993), Madoc (1976), van Marle & Voous (1988), Mayr (1944b), Medway & Wells (1976), Melville (1989), Ng & Wee (1994), Rutgers & Norris (1970), Smythies (1981, 1986), Stepanyan (1995), Thiollay (1995), Verheugt *et al.* (1993), Viney (1987), White & Bruce (1986), Yang Lan *et al.* (1995).

196. Grey-cheeked Green-pigeon

Treron griseicauda

French: Colombar à face grise **German:** Graumaskentaube **Spanish:** Vinago Carigrís
Other common names: Grey-faced (Thick-billed) Green-pigeon, Grey-cheeked Pigeon

Taxonomy. *Treron griseicauda* G. R. Gray, 1856, Java. Sometimes considered to be a race of either *T. pompadora* or *T. curvirostra*; perhaps most closely allied to latter. Internal nomenclature of species has been much debated: Bonaparte's description was considered invalid, and replaced by a later description of same name by Wallace, attributable to Sulawesi, so nominate race was applied to Sulawesi birds; latter description may be pre-dated by one by Schlegel; however, Bonaparte's description now considered acceptable, and thus reinstated by most authors. Several other races proposed. Four subspecies recognized.

Subspecies and Distribution.

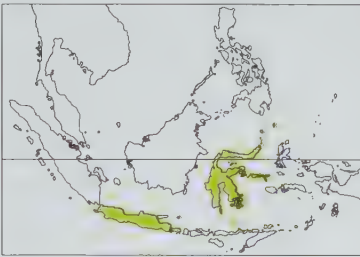
T. g. sangirensis Brüggemann, 1876 - Sangihe and Talaud Is.

T. g. wallacei (Salvadori, 1893) - Sulawesi and offshore islands to NE (Manadotua, Manterawu, Bangka, Lembeh), E (Togian) and S (Salayar, Muna, Butung, Tukangbesi, Tanahjampea, Kalao, Kalaotoa, Madu), and also Banggai Is (Peleng, Banggai) and Sula Is (Taliabu, Seho, Mangole, Sanana).

T. g. griseicauda G. R. Gray, 1856 - Java and Bali.

T. g. vordermani Finsch, 1900 - Kangean Is.

Descriptive notes. 25-26 cm. Similar to larger *T. curvirostra*, but male has pinkish gold patch (often obscure) on side of lower neck, and central area of breast always green; both sexes have grey of crown extending onto face and upper throat; cere green or blackish, sometimes with buff patch on top. Juvenile presumably fairly similar to adult female. Race *vordermani* has yellowish neck and purplish wash to breast; *wallacei* has spots on sides of breast more orange; *sangirensis* similar to previous race, but duller and less yellowish green.



Habitat. Open country, forest edge and cultivated areas with scattered trees. In Sulawesi, reported at 250-1000 m; in E Java up to 2500 m; from sea-level to 600 m on Sangihe Is.

Food and Feeding. Frugivorous, especially fond of figs (*Ficus*). Congregates with other pigeons, especially *T. vernans*, as well as parrots and cuckoo-shrikes at fruiting trees; typically feeds in the canopy; usually seen in pairs, but 100's occasionally congregate at abundantly fruiting trees.

Breeding. In Java and Bali, breeds Jan-Aug. Nest is a flimsy platform of twigs. Lays 2 white eggs. No further details available.

Movements. Probably resident in most parts, although may wander to S Sumatra; basis for this suggestion is old, inadequately and perhaps incorrectly labelled specimens.

Status and Conservation. Not globally threatened. No precise details available. Species appears to be fairly common in many areas including lowlands of Java and Bali; widespread and generally common throughout much of Wallacea, though uncommon on Sangihe.

Bibliography. Andrew (1992), van Bemmél & Voous (1951), Bishop (1992), Coates & Bishop (1997), Dutson (1995), Gibbs (1990), Hellebrekers & Hoogerwerf (1967), Holmes & Phillips (1996), Husain (1958), MacKinnon (1988), MacKinnon & Phillips (1993), van Marle & Voous (1988), Mayr (1944b, 1956), Mees (1973), Parrott & Andrew (1996), Rozendaal & Dekker (1989), Stresemann (1941), Watling (1983), White & Bruce (1986).

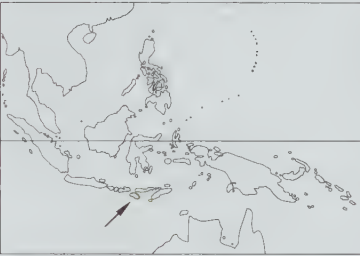
197. Sumba Green-pigeon

Treron teysmannii

French: Colombar de Sumba **German:** Teysmannntaube **Spanish:** Vinago de Sumba

Taxonomy. *Treron Teysmannii* Schlegel, 1879, Sumba. Closely allied to *T. curvirostra*; has been considered a race of that species or of *T. pompadora*. Monotypic.

Distribution. Sumba (WC Lesser Sundas).



Descriptive notes. c. 28 cm. General coloration soft grey-green becoming bright yellow-green on forehead, lores, throat, rump and uppertail-coverts; lower mantle, scapulars and some inner wing-coverts purplish chestnut; outer median and greater coverts and secondaries black, edged bright yellow; primaries greyish black with narrow whitish edges; vent, tibial feathers and undertail-coverts green and yellowish white; central rectrices yellow-green, outer ones dark grey at base with obscure darker central bar and apical half greyish white. Female lacks purplish chestnut on upperparts and has wing markings yellowish white, not

bright yellow. Juvenile presumably fairly similar to adult female.

Habitat. Lowland primary, selectively logged and tall secondary forest, up to c. 800 m. Appears to favour closed-canopy forest, but occurs in areas with relatively low tree density.

Food and Feeding. Little information on diet. Feeds in crowns of fruiting trees, e.g. *Streblus asper* and *Ficus benjamina*; occasionally on cauliflorous fruits lower down. Pairs defend their feeding territories both intraspecifically and against other bird species, e.g. *Ptilinopus melanospila* and Short-tailed Starling (*Aplonis minor*). Occurs singly, in pairs or flocks of up to 12 birds.

Breeding. Egg-laying recorded in May. No description of nest or breeding behaviour.

Movements. Presumed resident.

Status and Conservation. Not globally threatened. Currently considered near-threatened. Still moderately common, but is presumably declining, due to continuing clearance of forest; very small range. Population estimated at probably over 14,000 birds, based on surveys in 1989 and 1992.

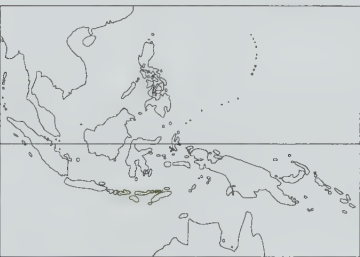
Bibliography. Andrew (1992), Coates & Bishop (1997), Collar & Andrew (1988), Gibbs (1990), Husain (1958), Jones, Juhaeni *et al.* (1994), Jones, Linsley & Marsden (1995), Mayr (1944b), Sujatnika & Jepson (1995), Sujatnika *et al.* (1995), White & Bruce (1986), Zieren *et al.* (1990).

198. Flores Green-pigeon

Treron floris

French: Colombar de Florès **German:** Floresgrüntaube **Spanish:** Vinago de Flores

Taxonomy. *Treron floris* Wallace, 1864, Flores. Closely allied to *T. curvirostra*; has been considered a race of that species or of *T. pompadora*. Monotypic.



Distribution. WC Lesser Sundas on Lombok, Sumbawa, Flores, Besar, Solor, Lomblen, Pantar and Alor.

Descriptive notes. c. 28 cm. General coloration soft green with faint yellow tinge on underparts and breast; forehead, face and crown pale grey; faint purplish bronze tinge on mantle; carpal edge and innermost secondaries dark grey; median-coverts, greater-coverts and secondaries greyish black, broadly edged pale yellow in both sexes; primaries grey-black, tibial feathers white; vent and undertail-coverts white marked green; central rectrices yellowish green, outer ones pale grey at base, dark

grey central band, apical half greyish white. Female similar to male but lacks purplish tinge on mantle. Juvenile presumably fairly similar to adult female.

Habitat. Lowland primary, tall secondary and coastal forest and woodland up to 600 m on Lombok, to 550 m on Sumbawa, and to 1000 m on Flores; may prefer drier forest. Usually occurs in small flocks of up to 10 birds, occasionally up to 20, but sometimes as singles or pairs.

Food and Feeding. Very little known. Feeds on small fruits, including figs. Forages in canopy.

Breeding. No information available.

Movements. Possibly locally nomadic, but no good information.

Status and Conservation. Not globally threatened. Currently considered near-threatened. No population data available, but species is considered to be rare on Sumbawa and uncommon on Flores, although locally numerous at fruiting trees.

Bibliography. Andrew (1992), Andrews (1988), Bishop (1992), Buck (1988), Butchart *et al.* (1996), Coates & Bishop (1997), Dutson (1995), Gibbs (1990), Jepson & Monk (1995), Holmes (1993), Husain (1958), Mayr (1944b), Schmutz (1977), Sujatnika *et al.* (1995), White & Bruce (1986).

199. Timor Green-pigeon

Treron psittacea

French: Colombar unicolore

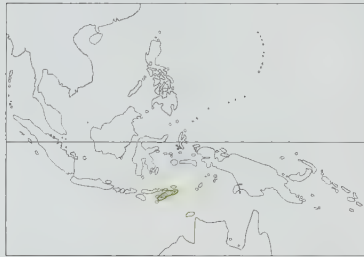
German: Timorgrüntaube

Spanish: Vinago de Timor

Taxonomy. *Columba Psittacea* Temminck, 1808, Timor.

Closely allied to *T. curvirostra*; has been considered a race of that species or of *T. pompadora*. Monotypic.

Distribution. EC Lesser Sundas on Roti, Semau and Timor.



Descriptive notes. c. 28 cm. General coloration soft, slightly greyish green becoming brighter on throat, rump and uppertail-coverts; carpal edge and innermost secondaries dark grey; median-coverts, greater-coverts and outer secondaries greyish black, broadly edged yellow; primaries grey-black, tibial feathers white; vent and undertail-coverts white marked with green; central rectrices yellowish green, outer ones pale grey at base, dark grey central band, apical half greyish-white; orbital skin pale bluish green; bill horn-coloured, basal half dull bluish; feet dark purplish red. Female duller green, with paler yellow wing markings.

Juvenile presumably fairly similar to adult female.

Habitat. Primary, tall secondary and monsoon forest in lowlands, up to 160 m.

Food and Feeding. Very few data. Only food noted is figs. Forages in fruiting trees, occasionally with other *Treron*; usually occurs in small flocks of up to 20 birds, but also occasionally as singles or pairs.

Breeding. No information available.

Movements. No information.

Status and Conservation. VULNERABLE. Lowland monsoon forest habitat of this species on W Timor has been greatly reduced and fragmented. The species was not detected in a nine-week survey in 1993, and may have been extirpated at a number of sites in W half of the island. In the past, it was reported to be commoner in E Timor, where lowland forests are more widespread.

Bibliography. Andrew (1992), Coates & Bishop (1997), Collar & Andrew (1988), Collar *et al.* (1994), Gibbs (1990), Hartert (1898a), Husain (1958), Johnstone & Jepson (1996), Mayr (1944b), Mees (1975), Noske (1995), Sujatnika & Jepson (1995), Sujatnika *et al.* (1995), White & Bruce (1986).

200. Large Green-pigeon

Treron capellei

French: Colombar de Capelle

German: Dickschnabeltaube

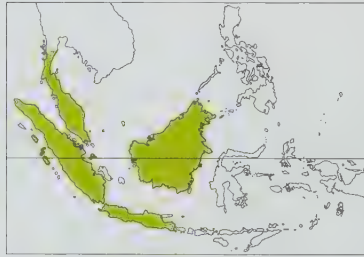
Spanish: Vinago Grande

Other common names: Large Thick-billed/Great Green-pigeon

Taxonomy. *Columba capellei* Temminck, 1823, Java.

Formerly placed in monotypic genus *Butoreron*; affinities uncertain, but appears to be allied to the predominant Asian *Treron* lineage, rather than the pin-tailed and wedge-tailed forms. Monotypic.

Distribution. Malay Peninsula through Sumatra and associated islands (Nias, Telo, Siberut and Lingga Archipelago) to Borneo and Java.



Descriptive notes. 35-36 cm; 411-500 g. Largest member of genus. General coloration light greyish olive green, palest on underparts and darkest on mantle and wing-coverts; median and greater wing-coverts and secondaries dark grey, primaries blackish grey; bright yellow edges to outer webs of median and inner greater coverts and inner secondaries forming bright yellow stripes on closed wing; breast dark golden or dull orange-yellow; outer tail feathers dark grey with pale grey terminal band, central ones olive-green; flanks tipped buff; long undertail-coverts dark chestnut; orbital skin pale yellow to golden yellow; bill

greenish white to pale green at tip, base and cere darker green; feet and legs yellow. Female similar, but breast greenish yellow and undertail-coverts buff and greenish grey. Juvenile like adult female, but young male has yellower breast and pale chestnut undertail-coverts.

Habitat. Lowland and foothill forest to 1300 m in Greater Sunda. Prefers primary forest and forest patches.

Food and Feeding. Frugivorous, including figs (*Ficus*). Typically recorded in small groups of up to 12 birds; often reaches fruit by hanging upside-down at tips of branches. No further information.

Breeding. No information available.

Movements. No information available.

Status and Conservation. Not globally threatened. Currently considered near-threatened. Reported to be not uncommon locally in Sumatra and Borneo; status indeterminate in W Sumatran islands; rare in Java, with no recent records. Regularly recorded but uncommon at Taman Negara National Park (Peninsular Malaysia).

Bibliography. Collar & Andrew (1988), Davison (1995), Deignan (1945), Dymond (1994), Hellebrekers & Hoogerwerf (1967), Holmes (1996), Holmes & Burton (1987), Husain (1958), Lekagul & Round (1991), MacKinnon (1988), MacKinnon & Phillips (1993), Madoc (1976), van Marle & Voous (1988), Medway & Wells (1976), Nash

& Nash (1988), Parrott & Andrew (1996), Robinson & Chasen (1936), Round (1988), Smythies (1981, 1986), Thiollay (1995), Verheugt *et al.* (1993), Wilkinson, Dutson & Sheldon (1991).

201. Yellow-footed Green-pigeon

Treron phoenicoptera

French: Colombar commandeur

German: Rotschultertaube

Spanish: Vinago Patigualdo

Other common names: Common/Yellow-legged Green-pigeon, Yellow-footed Pigeon

Taxonomy. *Columba phoenicoptera* [sic] Latham, 1790, India.

Allied to African *Treron* species; closest affinities appear to be with *T. waalia*. Five subspecies recognized.

Subspecies and Distribution.

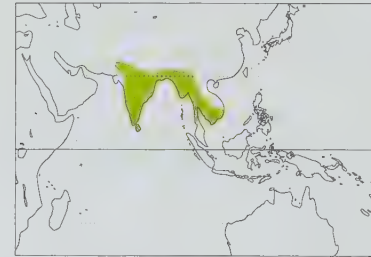
T. p. phillipsi Ripley, 1949 - Sri Lanka.

T. p. chlorogaster (Blyth, 1843) - India S of Gangetic Plain.

T. p. phoenicoptera (Latham, 1790) - E Pakistan and N India E through Himalayan foothills and Gangetic Plain to Assam and Bangladesh.

T. p. viridifrons Blyth, 1846 - extreme SC China (S Yunnan), Myanmar (to N Tenasserim) and NW Thailand.

T. p. annamensis (Ogilvie-Grant, 1909) - E Thailand, S Laos and S Vietnam (Annam, Cochinchina).



Descriptive notes. 33 cm; 226-248 g. Top of head, nape and cheeks bluish grey, washed with yellowish green on forehead; throat yellowish green becoming bright mustard yellow on neck and breast and darker mustard yellow on hindneck; pale grey band across mantle, separating dark yellow hindneck from yellowish green upperparts; pale mauve patch on shoulder of wing; primaries and secondaries blackish, edged light yellow; broader yellow edges to greyish green greater wing-coverts; basal half of tail feathers washed yellowish green, rest slate grey; underparts except breast pale bluish grey washed yellowish green, and flank feathers edged whitish or yellow; tibia and upper tarsus yellow; undertail-coverts purplish chestnut with broad buffy tips; undertail blackish on basal half, silvery grey distally; orbital skin pale greenish or pale grey; bill greyish white, pale grey or pale greenish, darker at base; legs and feet bright yellow or yellowish orange. Female similar but duller, with smaller mauve shoulder patch. Juvenile duller and paler than adult, with little or no mauve on shoulder. Race *chlorogaster* has yellow legs, most of underparts greenish yellow, and little or no greenish yellow on forehead or tail; *phillipsi* smaller and duller, with green of upperparts strongly tinged grey; *viridifrons* has bright greenish yellow forehead, and little or no yellowish green suffusion on grey underparts; *annamensis* like previous race but much duller, especially in green and yellow areas of plumage.

Habitat. Forest, scrubland, parks and gardens in lowlands and foothills; avoids high mountains, but found through lowlands of Nepal. In Pakistan, often associated with towns, especially where pipal (*Ficus religiosa*) trees have been planted along streets.

Food and Feeding. Frugivorous, feeding on a variety of drupes, berries (including mulberries) and wild figs (Moraceae); figs are particularly important part of the diet; other recorded foods include *Zizyphus* (Rhamnaceae), *Terminalia* (Combretaceae), *Buchanania* (Anacardiaceae) and *Eugenia* (Myrtaceae); also reported to feed on buds, shoots and cultivated grain. Will come to the ground to visit salt-licks; usually seen in small flocks of up to 10 individuals, which may gather into large congregations at abundant food sources.

Breeding. Peak breeding Mar-Apr in India. Nest is a relatively slight platform of twigs in a tree or shrub; two or more pairs will often nest in close proximity, sometimes in the same tree; nest often placed in a tree that holds a Black Drongo (*Dicrurus macrocerus*) nest, presumably to gain protection from the vigilance of that aggressive species. Lays 2 white eggs; incubation reported to last c. 14 days.

Movements. Generally resident, with local movements in response to fruit availability. In Pakistan, locally nomadic, visiting Punjab in winter and probably only very rarely staying to breed.

Status and Conservation. Not globally threatened. Few precise details available, but species widespread and considered to be common in many parts of its extensive range. In Pakistan, common in Punjab, having probably expanded range and increased in number over last 50+ years, due to spread of irrigation and tree plantations; often occurs in towns. Uncommon in Thailand, where appears to have declined. Uncommon and very local in Sri Lanka.

Bibliography. Ali (1996), Ali & Ripley (1981), Baker (1913), Deignan (1945), Husain (1958), Inskipp & Inskipp (1991), Lekagul & Round (1991), MacDonald (1948), Majumdar *et al.* (1992), Mukherjee (1995), Phillips (1978), Pillay (1952), Ripley (1949), Roberts, T.J. (1991), Round (1988), Rutgers & Norris (1970), Saha & Dasgupta (1992), Smythies (1986), Yang Lan *et al.* (1995).

202. Bruce's Green-pigeon

Treron waalia

French: Colombar waalia

German: Waaliataube

Spanish: Vinago Waalia

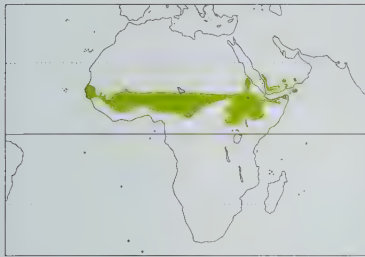
Other common names: Yellow-bellied Green-pigeon

Taxonomy. *Columba waalia* F. A. A. Meyer, 1793, near Lake T'ana, Ethiopia.

A member of the African species-group of green-pigeons, but apparently most closely allied to *T. phoenicoptera* of S Asia. Monotypic.

Distribution. S Mauritania and Senegambia E through Sahel zone to Eritrea and N Somalia; also Socotra, Yemen, SW Saudi Arabia and extreme W Oman (Dhofar).

Descriptive notes. 28-30 cm; 251-268 g. Head, neck and breast light greenish grey; mantle, back, rump, scapulars, most wing-coverts, and innermost secondaries light yellowish olive-green; central lower breast and belly bright yellow, greyish green sides to breast; flanks and tibial feathers dark green with whitish borders; long undertail coverts chestnut or mixed olive and chestnut with broad creamy tips; lesser wing-coverts mostly light purple forming large patch on shoulder of wing; primaries, outer secondaries and outermost greater wing-coverts blackish, the former narrowly and the latter broadly fringed yellow, forming conspicuous stripes on the closed wing; tail feathers dark grey, usually washed green, with broad light grey tips, the two central ones almost uniform grey or grey-green; undertail blackish, conspicuously and broadly tipped pale grey; bill bluish white or pale bluish grey with dark purplish base; legs and feet yellow or orange with pale claws. Sexes similar but female slightly smaller and duller. Juvenile at first greyer and duller with very woolly plumage, and only a trace of purple on bend of wing.



Habitat. Densely wooded valleys, forest patches near water-holes, and less commonly savanna and thorn-scrub woodland in Sahel zone, ranging from sea-level up to 2000 m.

Food and Feeding. Frugivorous; reported to feed largely on various species of figs (Moraceae), particularly *Ficus platyphylla* and, in Sudan, *F. sycamorus*; also known to feed on fruits of *Podocarpus* and *Zizyphus*. Feeds mainly in the canopy and very rarely comes to the ground except to drink; may converge on fruiting trees in large flocks of 50 or more birds, occasionally in company with *T. calva*.

Breeding. Recorded Dec-Sept in W Africa; Nov-May in N parts of E Africa; and Apr-May in rest of E Africa; in Arabia, young in nest May-Jun, but eggs also reported in Jul. Nest is frail platform of twigs in tree or shrub, often in terminal twigs of a thick tree, 2.5-8 m up; most commonly nests in date palm groves on Socotra. Lays 1-2 glossy white eggs.

Movements. Little information; in Africa, resident in many areas, although at least partially nomadic in response to food and water availability, e.g. in N Nigeria. Resident in SW Arabia and Socotra I, with highland populations dispersing to lowland areas in winter. A fast flier.

Status and Conservation. Not globally threatened. Frequent to locally abundant throughout much of its range, although apparently commoner in first half of 20th century. Not uncommon in Gambia; common in Ghana, Togo and Nigeria. Reported to be subject to severe hunting pressure for sport, and as a result species is shy and timid. CITES III in Ghana.

Bibliography. Ash & Miskell (1983), Bannerman (1953), Britton (1980a), Brooks (1987), Brooks *et al.* (1987), Chapin (1939), Cornwallis & Porter (1982), Dowsett & Forbes-Watson (1993), Elgood *et al.* (1994), Evans, M.I. (1994), Friedmann (1930a), Giraudoux *et al.* (1988), Gore (1990), Grimes (1987), Hollom *et al.* (1988), Husain (1958), Jennings (1995), Lamarche (1980), Lewis & Pomeroy (1989), Lippens & Wille (1976), Louette (1981), Mackworth-Praed & Grant (1957, 1970), Morel & Morel (1990), Nikolaus (1987), Porter *et al.* (1996), Rösler (1996), Rutgers & Norris (1970), Short *et al.* (1990), Smith (1957), Snow (1978), Urban *et al.* (1986), Walsh (1981), Zimmerman *et al.* (1996).

203. Madagascar Green-pigeon

Treron australis

French: Colombar maïtsou **German:** Graunasen-Grüntaube **Spanish:** Vinago Malgache
Other common names: Moheli Green-pigeon (*griveaudi*)

Taxonomy. *Columba australis* Linnaeus, 1771, south-eastern Madagascar.
With the exception of the more distinct *T. waalia*, the green-pigeons of African mainland and islands form a closely related group, within which species limits have been much debated. Present species of Madagascar has often been considered conspecific with *T. calva* of the mainland; how-

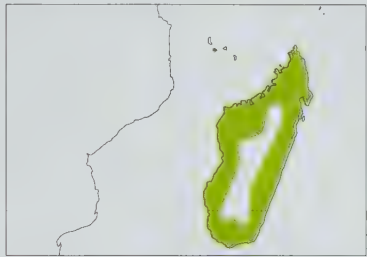
ever, based on differences in cere colour and on geographical separation of forms, it seems most appropriate to consider present species as forming a superspecies with *T. calva*, *T. pembaensis* and *T. sanctithomae*. Three subspecies recognized.

Subspecies and Distribution.

T. a. griveaudi Benson, 1960 - Mwali (Moheli) in Comoro Is; in past, probably also on Ngazidja (Grand Comoro) and Ndzuani (Anjouan).

T. a. xenia Salomonsen, 1934 - W Madagascar.

T. a. australis (Linnaeus, 1771) - Madagascar E of the high plateau.



Descriptive notes. 32 cm; 180-240 g. Head, neck and breast bright yellow-green with an olive tinge, becoming greyish green on flanks; vent and tibial feathers mottled dark green and yellow; upperparts greyish green; shoulder of wing light mauve; secondaries and primaries black; pale yellow edges to outer median- and greater-coverts, and secondaries forming yellow stripes on closed wing; central tail feathers bluish grey, outer ones with ill-defined blackish central bar and broad pale grey terminal band; undertail-coverts chestnut, tipped buffy white; bill pale grey, darker grey at base; legs and feet yellow or yellow-orange. Sexes

similar but female usually with less mauve on lesser wing-coverts. Race *xenia* slightly paler and greyer, with little or no green on the bright yellow tibial feathers; *griveaudi* much greyer on head and upperparts but deep yellow-green on breast, belly and uppertail-coverts, while long undertail-coverts are chestnut without white tips; legs and feet reddish purple.

Habitat. Variety of forest types on Madagascar, including open coastal woodland, dry spiny forest, gallery forest in savanna, and areas of second growth and plantations, from sea-level up to 1000 m. In Comoros, reported only from evergreen forests at higher elevations.

Food and Feeding. Frugivorous; diet includes figs (*Ficus*); also observed feeding on *Ordia* fruit. Forages in low bushes as well as trees, but usually in the canopy; typically in pairs or small groups, occasionally 15-25 birds.

Breeding. Reported nesting in Oct-Dec. Nest is a loosely constructed flat structure of twigs and moss, built by both sexes; recorded c. 12 m up on horizontal fork in tree, in forest or plantation. Lays 2 white eggs.

Movements. No information available. Flight reported to be very rapid.

Status and Conservation. Not globally threatened. No precise details, but nominate race is widely distributed and often common; race *xenia* appears to be generally uncommon. Overall trends have not been determined, but hunting is known to be causing declines locally.

Bibliography. Amadon (1953), Bangs (1918), Benson (1960), Benson *et al.* (1976-1977), Berlioz (1948), Chapin (1939), Dee (1986), Dowsett & Dowsett-Lemaire (1993), Dowsett & Forbes-Watson (1993), Grote (1931), Husain (1958), King (1978/79), Langrand (1990), Louette (1988, 1992), Louette & Stevens (1992), Louette *et al.* (1988), Milon *et al.* (1973), Newton (1863), Rand (1936), Snow (1978), Young, G. (1995).



204. African Green-pigeon

Treron calva

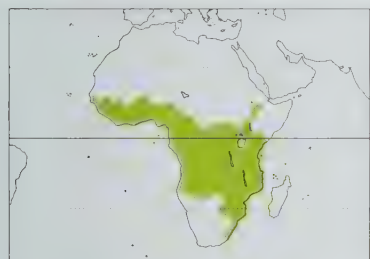
French: Colombar à front nu **German:** Rotnasen-Grüntaube **Spanish:** Vinago Africano
Other common names: Green/African Fruit-pigeon

Taxonomy. *Columba Calva* Temminck, 1808, Loango.

With the exception of the more distinct *T. waalia*, the green-pigeons of African mainland and islands form a closely related group, within which species limits have been much debated. Present species of mainland Africa has often been considered conspecific with *T. australis* of Madagascar; however, based on differences in cere colour and on geographical separation of forms, it seems most appropriate to consider present species as forming a superspecies with *T. australis*, *T. pambaensis* and *T. sanctithomae*. Race *delalandii* has sometimes been considered a separate species, but intergrades with other races occur. Present species rather variable; further study will probably reduce the number of valid races. Seventeen subspecies recognized.

Subspecies and Distribution.

- T. c. nudirostris* (Swainson, 1837) - Senegal, Gambia and Guinea-Bissau.
T. c. sharpei (Reichenow, 1902) - Sierra Leone to S Nigeria and N Cameroon.
T. c. calva (Temminck, 1808) - E Nigeria (R Cross) E to NE Zaire (Ituri region) and S to C Angola; Príncipe I.
T. c. poensis Hartert & Goodson, 1918 - Bioco (Fernando Póo).
T. c. uellensis (Reichenow, 1912) - N Zaire (R Uelle) E to S Sudan and Uganda.
T. c. brevicera Hartert & Goodson, 1918 - SW Ethiopia S to N Tanzania, E of Rift Valley (except coastal regions).
T. c. salvadorii (Dubois, 1897) - Uganda, Rwanda and Burundi S to E Zaire.
T. c. granviki Grote, 1924 - W Kenya and NW Tanzania.
T. c. wakefieldii (Sharpe, 1874) - coastal regions of Kenya and NW Tanzania, including Usambara Mts.
T. c. granti van Someren, 1919 - lowland E Tanzania and Zanzibar.
T. c. orientalis (Gunning & Roberts, 1911) - S Tanzania, Mozambique and lower Zambezi Valley.
T. c. schalowi Reichenow, 1880 - S Zaire (Katanga) and Zambia S to region of Victoria Falls.
T. c. chobiensis (Roberts, 1932) - SW Zimbabwe and N Botswana.
T. c. ansorgei Hartert & Goodson, 1918 - S Angola.
T. c. vylderi Gyldenstolpe, 1924 - NW Namibia.
T. c. damarensis (Reichenow, 1901) - NE Namibia and NW Botswana.
T. c. delalandii Bonaparte, 1854 - coast from Kenya (Mombasa) to South Africa (E Cape Province).



Descriptive notes. 25-30 cm; male 160-285 g, female 130-225 g. Large cere extending far back beyond nostrils. General plumage olive-green, tinged yellow on head and underparts; obscure grey patch on hindneck and upper mantle; dark mauve patch on wing bend; outer secondaries and primaries black, the former with pronounced and the latter faint pale yellow edges to outer webs; broader pale yellow edges to greater-coverts forming prominent yellow stripe on folded wing; flanks mottled dark green and yellow; tibial feathers yellow; shorter undertail-coverts dark green tipped white, longer undertail-coverts chestnut with

pale buff tips; central tail feathers bluish grey, sometimes with faint green wash; outer ones dark grey, sometimes faintly washed green, with broad grey terminal band; undertail blackish at base, pale grey at tip; bill grey with paler tip; base of bill and cere red or deep pink; legs and feet yellow, dark yellow or orange-yellow. Sexes similar but female has smaller and duller cere and slightly duller plumage. Juvenile resembles adult but yellower on belly and lacks mauve on wing; body plumage much softer looking, with ill-defined yellow-green fringes to most of upperparts, which are otherwise greyer than adult. The many races exhibit a general trend from yellow-footed, large-cered, grey-tailed forms in W, to red or orange-footed, small-cered forms with green or green-tinged tails in E and SE; most distinctive form is *delalandii* which has greenish grey head, neck, breast and underparts, very bright yellowish green upperparts, and tail feathers mostly dark yellow-green with a broad whitish green terminal band.

Habitat. A variety of forest and wooded savanna habitats, including riverine *Ficus* forest, *Brachystegia* and *Combretum* woodland, margins of evergreen forest, clumps of trees in savanna, and mangrove.

Food and Feeding. Frugivorous, taking a variety of fruits and berries; particularly fond of figs (Moraceae) but also takes fruits of *Musanga acropoides*, *Syzgium cordatum*, *Diospyros mespiliformis*, *Podocarpus*, *Melia azederach*, *Duranta repens*, *Myrica conifera*, *Mimusops*, *Cassina schlechteri*, *Papea capensis*, and cultivated mulberry, peach, raisins, bananas and papaya; has also been reported to feed on mangrove buds, young millet and wild grass seeds on the ground. Feeds acrobatically in the trees, climbing and hanging to reach fruit; usually seen in groups of 3-50 birds, but may form larger aggregations at abundant food sources; seldom solitary.

Breeding. Probably occurs almost all year round in S Africa, reported May-Feb in Zimbabwe, and Aug-Jan in South Africa; mainly Jan-Apr/Aug in W Africa, but Oct-Apr in Sierra Leone; all months, but with local variations in E Africa. Occasionally nests in loose aggregations, e.g. 11 nests in 5.5 ha in Kruger National Park, South Africa. Nest is frail platform of twigs on sloping or horizontal fork of leafy tree, 2.5-21 m up; both sexes participate in nest building; sometimes in a clump of mistletoe; also reported sometimes to use old *Streptopelia* nests. Usually 2 white eggs, but sometimes only 1, especially in W & C Africa; incubation 13-14 days by both sexes; fledging 11-13 days.

Movements. Sedentary and resident in many areas, but perhaps more often performs local migrations, or is nomadic in response to food availability, particularly of figs. Flight very rapid.

Status and Conservation. Not globally threatened. Frequent to locally abundant throughout much of its extensive range, although declining in some areas, e.g. Gambia and Príncipe I, due to habitat destruction; nevertheless, species appears relatively adaptable to altered habitats. Considered common in Sierra Leone, Ghana, Togo and Nigeria; not uncommon in Gambia. Known to be trapped for food in Ghana, and this probably occurs elsewhere too. CITES III in Ghana.

Bibliography. Amadon (1953), Bannerman (1953), Benson & Benson (1977), Britton (1980a), Chapin (1939), Colston & Curry-Lindahl (1986), Dowsett & Dowsett-Lemaire (1993), Dowsett & Forbes-Watson (1993), Elgood *et al.* (1994), Friedmann (1930a), Ginn *et al.* (1989), Gore (1990), Grimes (1987), Grote (1931), Husain (1958),

Lewis & Pomeroy (1989), Lippens & Wille (1976), Louette (1981), Mackworth-Præd & Grant (1957, 1962, 1970), Maclean (1993), McLachlan (1984), de Naurois (1994), Nikolaus (1987), Penry (1994), Pérez del Val (1996), Pérez del Val *et al.* (1994), Pinto (1983), Rösler (1996), Rowan (1983), Rutgers & Norris (1970), Short *et al.* (1990), Snow (1978), Tarboton & Vernon (1971), Urban *et al.* (1986), Vincent (1934), Zimmerman (1972), Zimmerman *et al.* (1996).

205. Pemba Green-pigeon

Treron pambaensis

French: Colombar de Pemba **German:** Pembagrüntaube **Spanish:** Vinago de Pemba

Taxonomy. *Treron pambaensis* Pakenham, 1940, Pemba Island.

With the exception of the more distinct *T. waalia*, the green-pigeons of African mainland and islands form a closely related group, within which species limits have been much debated. Present species sometimes considered a race of *T. australis* or *T. calva*; however, based on differences in cere colour and on geographical separation of forms, it seems most appropriate to consider present species as forming a superspecies with *T. australis*, *T. calva* and *T. sanctithomae*. Monotypic.

Distribution. Pemba (off NE Tanzania).



Descriptive notes. c. 25 cm. Somewhat similar to *T. calva*, but smaller and darker. Head, neck, breast and underparts slate grey tinged green; dark mauve patch on shoulder; upperparts greyish olive-green, brighter on rump and uppertail-coverts; bill greyish white at tip; base and cere dull red; legs and feet yellow or orange. Female likely to be slightly duller than male, as in related species. Juvenile plumage undescribed.

Habitat. Forest, parks and well wooded gardens; prefers extensively wooded areas in N.

Food and Feeding. Frugivorous; reported to be partial to the young fruits of the betel palm

(*Areca catechu*) and figs; also observed perching in mango and *Pterocarpus* trees. Feeds in small groups in the canopy.

Breeding. Reported in Oct-Feb on N Pemba, but probably also occurs at other times, as males in S of island were in breeding condition in Apr and Jun. Sometimes breeds in the vicinity of houses. Nest is a frail and untidy platform of twigs, often near end of bough; 2-3 nests may be built before final site selected; nest built by both adults share nest-building duties. Lays 2 white eggs. Nests and eggs are apparently often destroyed by wind gusts.

Movements. Mainly resident. Reported to be subject to local movements, presumably governed by food availability.

Status and Conservation. Not globally threatened. Currently considered near-threatened. Still fairly common locally in well wooded areas of Pemba and its associated coral islets; however, has very restricted range.

Bibliography. Britton (1980a), Dowsett & Dowsett-Lemaire (1993), Dowsett & Forbes-Watson (1993), Grote (1931), Husain (1958), Mackworth-Præd & Grant (1957), Pakenham (1940, 1943, 1979), Short *et al.* (1990), Snow (1978), Urban *et al.* (1986), Zimmerman *et al.* (1996).

206. Sao Tome Green-pigeon

Treron sanctithomae

French: Colombar de Sao Tomé **German:** Sao-Tomé-Grüntaube **Spanish:** Vinago de Santo Tomé

Taxonomy. *Columba S. Thomae* J. F. Gmelin, 1789, São Tomé.

With the exception of the more distinct *T. waalia*, the green-pigeons of African mainland and islands form a closely related group, within which species limits have been much debated; however, based on differences in cere colour and on geographical separation of forms, it seems most appropriate to consider present species as forming a superspecies with *T. australis*, *T. calva* and *T. pambaensis*. Monotypic.

Distribution. São Tomé; formerly also on nearby I das Rôlas.



Descriptive notes. c. 30 cm. Similar to dull-coloured forms of *T. calva*, differing most notably in its heavy, strongly arched bill and small cere; head, neck and most of underparts dark greenish grey; vent and tibial feathers bright yellow and dark green; mantle, back, rump and wing-coverts dark olive green; dark mauve patch on bend of wing; primaries and secondaries blackish; pale yellow edges to greater coverts and narrow pale edges to secondaries; tail grey with olive tint; blackish central band poorly defined; undertail-coverts chestnut with creamy tips. Sexes alike. Juvenile plumage has not been undescribed.

Habitat. Mainly in primary forest, but also occurs in secondary forests and plantations to 1600 m; commonest above 300 m.

Food and Feeding. Frugivorous, usually found high (above 12 m) in the canopy, feeding on banana, *Ficus* and *Musanga* fruits. It is unknown whether the heavy, arched bill is adapted for a particular diet.

Breeding. Breeds from late Nov until Apr/May. A slight, loosely constructed platform of twigs. The only nest described was located 2.5 m up in a cocoa tree; it contained one fresh egg in early Jan (final clutch size unknown).

Movements. No information.

Status and Conservation. Not globally threatened. Long extinct on I das Rôlas, where exterminated as a result of forest destruction. Still frequent to common on São Tomé in all forested habitats including plantations, during a survey in 1990, despite being the most commonly shot pigeon, and

a favourite quarry of local people. Hunting pressure does not currently appear to be having any serious adverse effects on the population.

Bibliography. Amadon (1953), Atkinson, Dutton *et al.* (1994), Atkinson, Peet & Alexander (1991), Bannerman (1915), Bocage (1903), Dowsett & Dowsett-Lemaire (1993), Dowsett & Forbes-Watson (1993), Husain (1958), Jones, P.J. & Tye (1988), Jones, P.J. *et al.* (1992), Mackworth-Præd & Grant (1970), de Naurois (1983a, 1994), Sargeant (1994), Snow (1950, 1978), Urban *et al.* (1986).

207. Pin-tailed Green-pigeon

Treron apicauda

French: Colombar à longue queue **German:** Spitzschwanz-Grüntaube **Spanish:** Vinago Rabudo
Other common names: Long-tailed Green-pigeon

Taxonomy. *Treron apicauda* Blyth, 1846, south-eastern Himalayas.

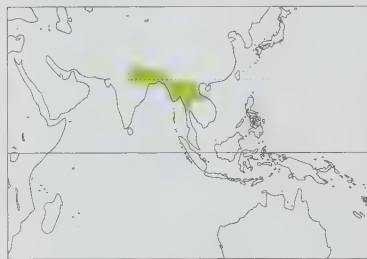
In past, sometimes placed in genus *Sphenurus*. Closely allied to *T. oxyura* and *T. seimundi*, and these three species may form a link between the African and other Asian *Treron* species; more distantly related to the *T. sphenura* species-group. Three subspecies recognized.

Subspecies and Distribution.

T. a. apicauda Blyth, 1846 - Himalayan foothills from Kumaon to E Assam and SW China (S Sichuan, NW & S Yunnan) and S Myanmar (Tenasserim).

T. a. lowei (Delacour & Jabouille, 1924) - mountains of W, NW & NE Thailand, C Laos and C Vietnam.

T. a. laotinus (Delacour, 1926) - mountains of Laos and N Vietnam.



Descriptive notes. Male 32 cm, female 28 cm; 185-255 g. General coloration bright yellowish green, palest on underparts and darkest on wing-coverts and scapulars; breast golden, yellow-gold or pinkish gold; ill-defined greyish band across mantle; outer secondaries and primaries black; yellow edges to median- and greater-coverts, and secondaries form yellow stripes on closed wing; two long pointed central tail feathers bluish grey, washed green at tips; remaining feathers in otherwise wedge-shaped tail bluish grey with black bases; flanks green, feathers tipped whitish; undertail-coverts chestnut with buff tips; orbital skin blue;

bill pale greenish or whitish blue at tip, bright blue at base; legs and feet red. Female duller, with at most a trace of gold on breast and grey on mantle; central tail feathers much less elongated; undertail-coverts dull yellow-brown and whitish with grey-green central streak. Juvenile resembles adult female. Race *lowei* has brighter greenish yellow rump and uppertail-coverts, but otherwise duller; *laotinus* duller than nominate and lacks bright uppertail-coverts of *lowei*.

Habitat. Forest and second growth, primarily in hill country up to c. 1800 m; sometimes occurs in wooded areas in the plains, especially when not breeding.

Food and Feeding. Frugivorous, feeding on a variety of fruits and berries, including some of very large size, which are swallowed whole. Descends to the ground to visit salt-licks. Feeding is acrobatic and parakeet-like; often found in flocks of 10-30 birds.

Breeding. Mainly Apr-Jun in Himalayan foothills; may breed all year round in SE Asia. Nest is a slight platform of twigs, 1.5-6 m above ground. Lays 2 white eggs.

Movements. Resident in some areas, locally nomadic in others in response to food supply. In Annam (C Vietnam), descends into plains in the dry season, May-Sept, when many trees there are in fruit; population of Thailand may be boosted by influx of migrants in winter. Flight swift and direct, producing a metallic whirring sound.

Status and Conservation. Not globally threatened. Few precise data available, but species said to be locally common throughout much of its sizeable range. Uncommon in Thailand; scarce in lowlands of Nepal.

Bibliography. Ali (1996), Ali & Ripley (1981), Baker (1913), Deignan (1945), Husain (1958), Inskipp & Inskipp (1991), Lekagul & Round (1991), Rutgers & Norris (1970), Smythies (1986), Stepanyan (1995), Thompson *et al.* (1993), Yang Lan *et al.* (1995).

208. Sumatran Green-pigeon

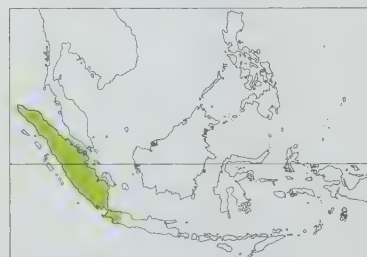
Treron oxyura

French: Colombar à queue pointue **German:** Gelbbauch-Grüntaube **Spanish:** Vinago de Sumatra
Other common names: Yellow-bellied Pin-tailed Green-pigeon

Taxonomy. *Columba oxyura* Temminck, 1823, Java.

In past, sometimes placed in genus *Sphenurus*. Closely allied to *T. apicauda* and *T. seimundi*, and these three species may form a link between the African and other Asian *Treron* species; more distantly related to the *T. sphenura* species-group. Monotypic.

Distribution. Sumatra and W Java.



Descriptive notes. 30-34 cm. Similar to *T. apicauda*, but tail shorter and less strongly pointed; general coloration darker and duller green, with an extensive bright yellow area on belly and ventral area, but no yellow on wings; orbital skin light green or bluish green. Female duller, with undertail-coverts yellowish buff streaked dark; lacks orange to golden brown markings on crown, breast and bend of wing.

Habitat. Thick forest in hilly and mountainous country, at altitude range of 350-1800 m in Sumatra but up to 3000 m in Java.

Food and Feeding. Fruits, including figs. Feeds in flocks. No further information.

Breeding. Virtually no information. A nest was discovered in the Padang Highlands in early Jan, but no other details available.

Movements. Locally nomadic, but never far from preferred habitat of thick hill forest.

Status and Conservation. Not globally threatened. Currently considered near-threatened. Reported to be uncommon throughout Barisan Range which runs down "spine" of Sumatra; also in other

parts of the island. In Java, restricted to mountains of W, occurring E to Papandayan. Survey work required in order to establish true current status; widespread loss of forest through both logging and fires suggests reassessment of status is necessary.

Bibliography. Andrew (1985, 1992), Hellebrekers & Hoogerwerf (1967), Holmes (1996), Husain (1958), MacKinnon (1988), MacKinnon & Phillips (1993), van Marle & Voous (1988), Robson (1987), Sujatnika *et al.* (1995), Tobias (1995).

209. Yellow-vented Green-pigeon

Treron seimundi

French: Colombar de Seimund **German:** Weißbauch-Grüntaube **Spanish:** Vinago Culigualdo
Other common names: White-bellied Pin-tailed Green-pigeon, Seimund's Green-pigeon

Taxonomy. *Sphenocercus seimundi* Robinson, 1910, Semangko Pass, Malay Peninsula.

In past, sometimes placed in genus *Sphenurus*. Closely allied to *T. apicauda* and *T. oxyura*, and these three species may form a link between the African and other Asian *Treron* species; more distantly related to the *T. sphenura* species-group. Two subspecies recognized.

Subspecies and Distribution.

T. s. seimundi (Robinson, 1910) - mountains of Malay Peninsula; also recorded in Bangkok area of S Thailand, but possibly only vagrant.

T. s. modestus (Delacour, 1926) - mountains of N & C Laos and C & S Vietnam (Annam, Cochinchina).



Descriptive notes. 30-33 cm. General coloration dark olivaceous green tinged coppery gold on forehead and crown, and lighter on breast, rump and uppertail-coverts; pinkish orange patch on sides of neck, varying amount of grey on hindneck and mantle; small reddish purple patch on carpal area of wing; outermost greater wing-coverts and secondaries black, broadly edged bright yellow on outer webs; belly snow white; undertail-coverts bright lemon yellow; elongated central rectrices dark bluish grey, outer ones greyish black with pale grey terminal band; orbital skin blue or purplish blue; bill greyish or grey-green at tip, blue or purplish blue at base; feet red or purplish red. Female lacks purple on wings and orange-pink suffusion at sides of neck. Race *modestus* differs in that male lacks pinkish orange patches on sides of neck and golden tinge on crown.

Habitat. Forest, primarily in foothills and mountains, but also occurs on SW coast of the Malay Peninsula in mangroves.

Food and Feeding. Frugivorous, reportedly feeding in the canopy of tall forest trees. No further details.

Breeding. No information, other than a report of a bird thought to be a recent fledgling in Malay Peninsula in Jun.

Movements. Very little information. Reported to descend to the plains of Annam (C Vietnam) in winter to breed.

Status and Conservation. Not globally threatened. Currently considered near-threatened. Severe deforestation has occurred in much of the montane habitat within this species' limited range. No precise details available, but species is reported to be uncommon in S Vietnam and rare in Malaysia. Survey work required.

Bibliography. Crosby (1995c), Deignan (1945), Delacour & Jabouille (1931), Husain (1958), Lekagul & Round (1991), Madoc (1976), Medway & Wells (1976), Robinson (1928), Robson *et al.* (1993a, 1993b), Round (1988).

210. Wedge-tailed Green-pigeon

Treron sphenura

French: Colombar chanteur **German:** Keilschwanz-Grüntaube **Spanish:** Vinago Rabocuña
Other common names: Singing Green-pigeon, Kokla; Korthals's Green-pigeon (*korthalsi*)

Taxonomy. *Vinago sphenura* Vigors, 1832, Himalayas.

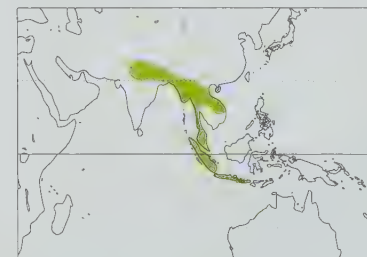
In past, sometimes placed in genus *Sphenurus*. Closely allied to *T. sieboldii* and *T. formosae*, and more distantly to *T. oxyura* species-group. Race *korthalsi* formerly considered a distinct species on basis of emarginated third primary, but this feature subsequently found in some birds of other races in present species. Proposed races *yunnanensis* and *oblitus* included in nominate; *annamensis* in *robinsoni*; and *etorques* in *korthalsi*. Three subspecies recognized.

Subspecies and Distribution.

T. s. sphenura (Vigors, 1832) - mountains and foothills of Kashmir E to SC China (SW Sichuan, W & S Yunnan, W Guangxi, Hainan), and S to S Myanmar (Tenasserim), N Thailand, Laos and N Vietnam.

T. s. robinsoni (Ogilvie-Grant, 1906) - mountains of Malay Peninsula and C Vietnam (Annam).

T. s. korthalsi (Bonaparte, 1855) - mountains of Sumatra, Java, Bali and Lombok.



Descriptive notes. 30-33 cm; 205-214 g. Head, neck and underparts bright yellowish-green, becoming coppery gold on crown and breast; breast feathers are salmon-pink, being golden only at tips; flanks and vent streaked pale yellowish and dark green; long undertail-coverts pale yellowish chestnut; hindneck bright green becoming vinous grey on upper mantle; inner wing-coverts and varying amount of scapulars and mantle dark purplish chestnut; rest of upperparts dark green or grey-green; outer secondaries and primaries blackish, with narrow yellow fringes to greater-coverts, secondaries and primaries; tail

bluntly wedge-shaped; central tail feathers concolorous with back; outer ones grey with blackish subterminal band; undertail light grey; orbital skin light blue; bill light blue at base, whitish blue or greyish at tip; feet bright red or deep pink. Female has head and breast entirely pale yellowish green, and upperparts dark green, lacking maroon and golden colours of male; undertail-coverts pale yellow with dark green central stripes. Juvenile much like adult female but duller; young male

often acquires some maroon feathers before fully grown. Race *robinsoni* smaller and darker, male usually with little golden colour on head and breast; *korthalsi* has darker golden breast in male, and has upperparts of duller, more olive green.

Habitat. Forests and second growth; primarily in broad-leaved forests of oak, elm, laurel and rhododendron; found in plains, foothills and mountains, at 1000-3000 m in India and Indochina; 1400-3000 m in Sumatra and Java (where usually at higher elevations than *T. oxyura*); and 1220-2900 m on Lombok.

Food and Feeding. Frugivorous, taking a variety of fruits and berries, including figs and mulberries (Moraceae), *Myrica* (Myricaceae), *Vaccinium*, *Rhododendron*, *Eurya* and *Schefflera*. Feeds acrobatically in canopy, often hanging upside-down to reach fruit on small twigs; visits the ground to pick up earth at salt-licks; occurs singly, in pairs and commonly in small flocks of 6-15 birds.

Breeding. Season Apr-Aug in N India. Can raise more than 1 brood in a year in some areas, e.g. Assam. Nest is a frail platform of twigs, usually 6 m or more up, though sometimes much lower; nest placed close to trunk on a large branch; in India, frequently nests in conifers; nest often placed near an active drongo (*Dicrurus*) nest, presumably to benefit from the aggressive defence provided by these species. Lays 1-2 white eggs; incubation, by both sexes, probably 18-19 days in wild. In captivity: incubation 14 days or less; fledging 12 days.

Movements. Generally resident, with local nomadic or altitudinal migratory movements, especially in N parts of breeding range. Flight swift and noisy.

Status and Conservation. Not globally threatened. Common in Himalayan foothills. Uncommon to locally common in Thailand, where considered to be commonest green-pigeon in hill forests. Widespread in S Vietnam. Reported to be locally common in Sumatra (Barisan Range from Mt Sibayak to Mt Dempo), less so in Java.

Bibliography. Ali (1996), Ali & Ripley (1981), Bailey (1917), Baker (1913), Beaman (1994), Biswas (1950), Coates & Bishop (1997), Deignan (1945), Dodsworth (1912, 1914), Échécopar & Hùe (1978), Hellebrekers & Hoogerwerf (1967), Husain (1958), Inskipp & Inskipp (1991), Jeyarajasingam (1994), Lekagul & Round (1991), MacKinnon & Phillips (1993), Majumdar *et al.* (1992), van Marle & Voous (1988), Medway & Wells (1976), Roberts, T.J. (1991), Robinson & Chasen (1939), Rutgers & Norris (1970), Smythies (1986), Thompson *et al.* (1993), Violani (1980), White & Bruce (1986), Yang Lan *et al.* (1995).

211. White-bellied Green-pigeon

Treron sieboldii

French: Colombar de Siebold **German:** Sieboldgrüнтаube **Spanish:** Vinago Japonés
Other common names: Japanese/White-bellied Wedge-tailed Green-pigeon. White-bellied Pigeon

Taxonomy. *Columba sieboldii* Temminck, 1835, Japan.

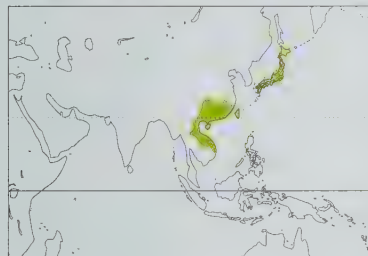
In past, sometimes placed in genus *Sphenurus*. Closely allied to *T. sphenura* and *T. formosae*, and more distantly to *T. oxyura* species-group. Several other races described, but now considered invalid. Three subspecies currently recognized.

Subspecies and Distribution.

T. s. sieboldii (Temminck, 1835) - Japan, mountains of Taiwan, and E China (Jiangsu, Fujian).

T. s. fopingensis Cheng *et al.*, 1973 - C China (E Sichuan, S Shaanxi).

T. s. murellae (Delacour, 1927) - SC China (Guizhou, Guangxi, Hainan) through N & C Vietnam (Tonkin, Annam) to extreme N Thailand.



1600 m in China, and 2300 m on Taiwan.

Descriptive notes. 33 cm. Closely resembles *T. sphenura*, except golden tinge generally less pronounced on breast and almost lacking on crown and forehead; belly paler, nearly white; undertail-coverts blotched or streaked grey-green on cream-coloured background; bill cobalt blue or greyish blue at base, greyer at tip; feet red or purplish red. Female lacks purple on wing-coverts and breast and forehead yellowish green. Races *murellae* and *fopingensis* both have rich golden tinge on forehead and breast.

Habitat. Forest, including dense temperate mixed woodland in Japan, and second growth, from coastal regions up to 1400 m in Japan,

Food and Feeding. Largely frugivorous; also reported to feed on acorns of *Quercus* and *Pasania* (Fabaceae). Forages primarily in trees and shrubs in groups of up to 10 birds, though may sometimes come to the ground to feed. Regularly visits sea coasts in Japan to drink, when flocks of 14-40 birds may congregate.

Breeding. Little information. Nesting commences in May-Jun in Japan, with territorial calling from mid-Feb. Nest is a flimsy, shallow, cup-shaped platform of twigs, 2-3 m above ground. Lays 2 white eggs.

Movements. Resident in most of its range, with some local movements in response to food supply. On Hokkaido, species is summer resident only, mainly May-Sept; winter records elsewhere in Japan are very few, and most of Japanese population may be migratory; possible winter records from Okinawa. Stragglers have reached Hebei (NE China), although these records might relate to escaped cage-birds.

Status and Conservation. Not globally threatened. Currently considered near-threatened. Formerly common, but now uncommon in Japan. Apparently still common in Taiwan. Very rare in N Thailand, where status considered uncertain. Populations require monitoring.

Bibliography. Austin & Kuroda (1953), Brazil (1991), Bruce (1975a, 1975b), Cheng Tsohsin *et al.* (1973), Crosby (1995c), Dokuchaev & Laptev (1974), Échécopar & Hùe (1978), Husain (1958), Jahn (1942), Knystautas (1993), Lekagul & Round (1991), Nagata (1953), Robson (1996c), Round (1988), Severinghaus & Blackshaw (1976), Stepanyan (1990a), Yamashina (1961).

212. Whistling Green-pigeon

Treron formosae

French: Colombar de Formose **German:** Formosagrüнтаube **Spanish:** Vinago de Formosa
Other common names: Formosan/Red-capped Green-pigeon

Taxonomy. *Treron formosae* Swinhoe, 1863, Taiwan.

In past, sometimes placed in genus *Sphenurus*. Closely allied to *T. sphenura* and *T. sieboldii*, and more distantly to *T. oxyura* species-group. Four subspecies recognized.

Subspecies and Distribution.

T. f. permagnus Stejneger, 1887 - N Ryukyu Is (Yakushima, Amami O-shima, Okinawa).

T. f. medioximus (Bangs, 1901) - S Ryukyu Is (Ishigaki, Iriomote, Yonaguni).

T. f. formosae Swinhoe, 1863 - mountains of Taiwan.

T. f. filipina Hachisuka, 1952 - N Philippines (Batan, Sabtang, Calayan, Camiguin Norte).



Descriptive notes. 35 cm. Closely resembles its close relatives *T. sphenura* and *T. sieboldii*, but tail less wedge-shaped; general plumage darker green, breast deep green, only slightly yellowish; crown deep golden bronze; belly and vent pale yellow marked with green. Female lacks dull purple patch on wing bend and golden bronze on head. Races differ in plumage and size; *permagnus* and *medioximus* larger and darker, and males lack golden bronze crown.

Habitat. Forest, including subtropical broad-leaved evergreen woodland in Ryukyu Is, trees around cultivation and even gardens in towns.

Food and Feeding. Frugivorous, feeding on small canopy fruits, including figs, and some seeds, but little specific information.

Breeding. In Ryukyu Is breeds from Apr onwards, with calling commencing in mid-Feb and nests found from early May. Nest up to 3 m above ground, e.g. in *Casuarina* trees. Typically 2 eggs.

Movements. Resident in Taiwan and Ryukyu. Race *filipina* apparently absent from its breeding range in local winter, though wintering range remains unknown.

Status and Conservation. Not globally threatened. Currently considered near-threatened. Very little known, but species described as uncommon and local in N Philippines and very rare in Taiwan; confiding and conspicuous in Ryukyu Is. Extensive research and survey work required.

Bibliography. Brazil (1991), Bruce (1975a, 1975b), Delacour & Mayr (1946), Dickinson *et al.* (1991), DuPont (1971), Échécopar & Hùe (1978), Husain (1958), McGregor (1909-1910), McWhirter (1985), Sonobe (1982), Swinhoe (1866).



Genus *PTILINOPUS* Swainson, 1825

213. Black-backed Fruit-dove

Ptilinopus cinctus

French: Ptilope à ceinture **German:** Weißkopf-Fruchttaube **Spanish:** Tilopo Dorsinegro
Other common names: Banded/White-headed Fruit-dove, White-headed(!)/Black-banded/Banded Pigeon

Taxonomy. *Columba Cincta* Temminck, 1810, Timor.

Formerly placed in genus *Leucotreron*; a later proposal returned present species to genus *Ptilinopus*, but within subgenus *Leucotreron* along with *P. alligator*, *P. dohertyi* and *P. porphyreus*; these four species currently considered to form a superspecies. Present species is the sister taxon of *P. alligator*, and these two forms are considered conspecific by some authorities; more work needed to clarify this question. Validity of race *baliensis* has been questioned, as very similar to *albocinctus*. Six subspecies recognized.

Subspecies and Distribution.

- P. c. baliensis* Hartert, 1896 - Bali.
- P. c. albocinctus* Wallace, 1864 - Lombok, Sumbawa and Flores.
- P. c. everetti* Rothschild, 1898 - Pantar and Alor.
- P. c. cinctus* (Temminck, 1810) - Timor, Wetar and Romang.
- P. c. lettiensis* (Schlegel, 1873) - Leti, Moa, Luang, Sermata and Teun.
- P. c. ottonis* Hartert, 1904 - Damar, Babar and Nila.



Descriptive notes. 34 cm. Head and neck yellowish or greyish white becoming pure white on breast; upperparts dark greenish black with grey terminal tail bar; uppertail-coverts dark grey; black bar across lower breast; belly and vent grey to yellowish; bill grey to yellowish orange; legs purple to red. Female similar but often with fine grey speckling on head and neck. Juvenile has yellow fringes to dark feathers of upperparts and greenish grey speckling in pale feathers of head, neck and breast. Race *everetti* differs by having fine grey speckling on neck and upper breast in both sexes; *albocinctus* has head, neck and upper breast pale bluish grey; *baliensis* hardly differs; *lettiensis* and *ottonis* similar to nominate but have broader, much whiter apical tail band.

Habitat. Forests and wooded areas, including *Casuarina* woodland from close to sea-level, but mainly at higher altitudes up to 1500 m.

Food and Feeding. Little information; reported to feed on fruits and berries taken from the branches. **Breeding.** Season reported as Apr-Jul on Lombok, Sumbawa, and Flores. In one captive breeding record: incubation 21 days; fledging 14 days; at fledging, young bird was c. one-third adult size and still had traces of down in plumage; adults not observed to feed the fledgling.

Movements. No information on seasonal movements but variable abundance of the species at some sites suggests that it may be nomadic. Flight is strong, powerful, and undulating; flushed birds take off with loud wing-clap.

Status and Conservation. Not globally threatened. Very limited information available, and species might appropriately be considered Data Deficient. No population estimates available; much of range lies within areas which have received very little ornithological investigation; research required on biology, ecology and status. Race *baliensis* is reported to be rare. One immature specimen reported to come from Tanimbar Is, but presence of species on these islands remains to be confirmed.

Bibliography. Andrew (1992), Butchart *et al.* (1996), Cain (1954a), Christidis & Boles (1994), Coates & Bishop (1997), Gibbs (1990), Hartert (1904), MacKinnon (1988), MacKinnon & Philipps (1993), Mayr (1944b), Noske (1995), Peters (1938), Webb & Robinson (1994), White & Bruce (1986).

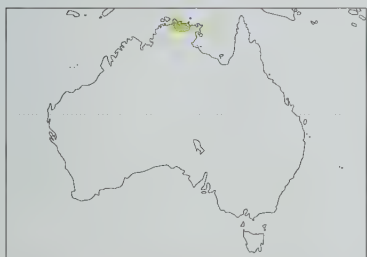
214. Black-banded Fruit-dove

Ptilinopus alligator

French: Ptilope de l'Alligator **German:** Graubauch-Fruchttaube **Spanish:** Tilopo del Alligator
Other common names: Black-banded/Banded Pigeon, Banded Fruit-dove

Taxonomy. *Ptilopus (Leucotreron) alligator* Collett, 1898, Arnhem Land, Northern Territory, Australia. Formerly placed in genus *Leucotreron*; a later proposal returned the present species to genus *Ptilinopus*, but within subgenus *Leucotreron* along with *P. cinctus*, *P. dohertyi* and *P. porphyreus*; these four species currently considered to form a superspecies. Present species is the sister taxon of *P. cinctus*, and these two forms are considered conspecific by some authorities; more work needed to clarify this question. Monotypic.

Distribution. Western escarpment of Arnhem Land from headwaters of South Alligator R, then S and W from El Sherana N to Oenpelli. Distribution in virtually inaccessible C and E areas of the escarpment is unknown.



Descriptive notes. 33-35 cm; 200-256 g. Head, neck and upper breast white with cream tinge; mantle and wings black, grading to grey on rump and uppertail-coverts; broad black band across lower breast, grading to dark grey belly, flanks and undertail-coverts; tail black with broad pale grey terminal band; bill greenish yellow with yellow tip; legs red. Juvenile like adult but duller and with greenish tinge to dark plumage; pale edging to feathers of mantle and upperwing-coverts; bill bluish grey, beginning to change to adult colour at c. 60 days.

Habitat. Relict areas of rain forest on sandstone escarpments along western edge of Arnhem Land.

Food and Feeding. Feeds on a variety of fruits including figs (*Ficus*, Moraceae), ebony (*Diospyros*, Ebenaceae), wild tobacco (*Solanum*, Solanaceae), and members of Anacardiaceae, Rosaceae.

Annonaceae, Elaeocarpaceae and Lauraceae. Fruits are plucked by birds perched on branches or twigs. Found singly, in pairs, or in small groups.

Breeding. Eggs late May to early Jul and Sept. Builds a loose, open platform of twigs 2.5-4 m up in a shrub or small tree. Clutch 1 egg. One nestling hatched in the wild and subsequently hand-reared was sparsely covered with pale grey down at hatching; at 30 days, its juvenile plumage was complete and it was very active; moult from juvenile to adult plumage began at c. 65 days, and was complete by 150 days.

Movements. Apparently sedentary, and rarely observed more than 1 km from the escarpment. Flight is strong, powerful and undulating; flushed birds take off with a loud wing-clap.

Status and Conservation. Not globally threatened. Currently considered near-threatened. Restricted to a relict habitat within a very small range. No population estimates available, in part due to inaccessibility of habitat. Until recently, range was virtually inaccessible to man, but uranium mining and tourist development may threaten survival of species in long term.

Bibliography. Austin *et al.* (1963), Blakers *et al.* (1984), Cain (1954a), Christidis & Boles (1994), Frith (1972, 1982), Garstone (1986), Higgins & Davies (1996), Lindsey, T.R. (1992), Macdonald (1988), Pizzey & Doyle (1980), Schodde & Tidemann (1986), Simpson & Day (1996), Slater (1978), Tronson & Tronson (1987).

215. Red-naped Fruit-dove

Ptilinopus dohertyi

French: Ptilope de Sumba **German:** Rahmkopf-Fruchttaube **Spanish:** Tilopo de Sumba
Other common names: Doherty's/Purple-tailed Fruit-dove

Taxonomy. *Ptilopus dohertyi* Rothschild, 1896, Sumba.

Formerly placed in genus *Leucotreron*; a later proposal returned the present species to genus *Ptilinopus*, but within subgenus *Leucotreron* along with *P. cinctus*, *P. alligator* and *P. porphyreus*; these four species currently considered to form a superspecies. Monotypic.

Distribution. Sumba (Lesser Sunda).



Descriptive notes. 35 cm. Head and upper part of neck cream-coloured; lower part of neck and breast pale pink with a narrow yellowish white border; large crimson patch on nape and hindneck; feathers hairy and somewhat elongated; upperparts dark iridescent blue or purplish blue, most of the feathers edged with very dark bronze green, which is predominant colour on mantle and inner wing-coverts; broad dark purple band across breast; belly and flanks greyish green; undertail-coverts streaked green and yellow; central rectrices dark purple; underwing and undertail greyish black; bill grey with yellow tip; legs purplish grey. Sexes alike. Juvenile (based on one female specimen only): areas that are pink and white in the adult are greenish white, faintly barred with pale olivaceous; upperparts dull bronzy green, with narrow yellow fringes to feathers; underparts pale green where green in adult, bronzy green where purple in adult.

Habitat. Inhabits forested areas, chiefly or perhaps exclusively. Has been collected at 500 m, and is known to occur down to 160 m, but mainly found at higher elevations.

Food and Feeding. No information available.

Breeding. No information available.

Movements. No information available.

Status and Conservation. **VULNERABLE.** Surveys in 1992 estimated the total population at c. 7452 birds; species was widespread, with higher densities in primary forest at higher elevations. Much forested habitat on Sumba has been cleared for grazing and agriculture, but to date the favoured montane forests have been less seriously affected.

Bibliography. Andrew (1992), Cain (1954a), Coates & Bishop (1997), Collar & Andrew (1988), Collar *et al.* (1994), Gibbs (1990), Jones, Juhaeni *et al.* (1994), Jones, Linsley & Marsden (1995), Mayr (1944b), Peters (1938), Sujatnika & Jepson (1995), Sujatnika *et al.* (1995), White & Bruce (1986), Zieren *et al.* (1990).

216. Pink-headed Fruit-dove

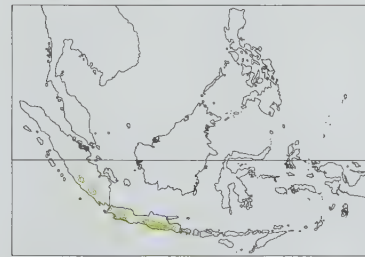
Ptilinopus porphyreus

French: Ptilope porphyre **German:** Rothals-Fruchttaube **Spanish:** Tilopo Cuellirroja
Other common names: Pink-necked Fruit-dove

Taxonomy. *Columba porphyrea* Temminck, 1823, Java.

Formerly placed in genus *Leucotreron*; a later proposal returned the present species to genus *Ptilinopus*, but within subgenus *Leucotreron* along with *P. cinctus*, *P. alligator* and *P. dohertyi*; these four species currently considered to form a superspecies. Monotypic.

Distribution. Sumatra (Mt Kerinci and Mt Dempu in Barisan Range), Java and Bali.



Descriptive notes. 29 cm. Male has entire head, neck and throat purplish pink, deepening to red on middle of breast, bordered by white band underlined by greenish black; upperparts green tinged with gold; primaries and outer secondaries blackish tinged with green; underparts grey with yellow vent; central rectrices bronzy olive green, outer rectrices greenish black with grey terminal bands; bill greenish; legs pink. Female fairly similar to male but has head and breast duller pink, feathers with olive fringes; breastbands less clear. Juvenile predominantly green with yellow fringes to most feathers.

Habitat. Forested areas in mountains, at altitudes of 1400-2200 m. Prefers oak-laurel and montane heath forests.

Food and Feeding. No information available.

Breeding. Recorded Oct-Nov. Nest is an untidy structure of twigs 5-6 m above ground. Clutch of 3 eggs recorded, but this is probably atypical.

Movements. No information available.

Status and Conservation. Not globally threatened. Very little known; species tends to be rather shy and inconspicuous. Extensive destruction of forests throughout species' range suggests local reductions probable; despite theoretical protection on Mt Kerinci by inclusion of Kerinci-Seblat National Park, constant retreat of park borders in the face of advancing agriculture implies important habitat loss for species. Research and survey work required.

Bibliography. Andrew (1985, 1992), van Balen & Marhadi (1989), Cain (1954a), Hellebrekers & Hoogerwerf (1967), Hoogerwerf (1948b), MacKinnon (1988), MacKinnon & Philipps (1993), van Marle & Voous (1988), Peters (1938), Robinson & Kloss (1924), Sujatnika *et al.* (1995), Tobias (1995).

217. Flame-breasted Fruit-dove

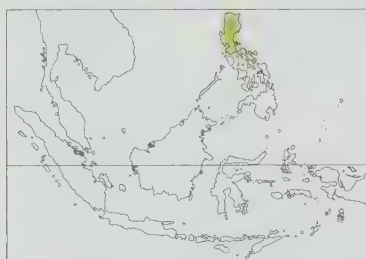
Ptilinopus marchei

French: Ptilope de Marche **German:** Blutschwingen-Fruchttaube **Spanish:** Tilopo de Marche
Other common names: Marche's Fruit-dove, Marche's/Black-eared Fruit-pigeon

Taxonomy. *Ptilopus* (*Rhamphiculus*) *Marchei* Oustalet, 1880, Luzon.

Formerly placed in genus *Leucotreron*; a later proposal returned all members of that group to *Ptilinopus*, but placed present species in subgenus *Rhamphiculus* along with other Philippine and Sulawesi forms *P. merrilli*, *P. occipitalis*, *P. fischeri*, *P. subularis* and *P. leclancheri*; characters of *Rhamphiculus* include relatively large size, and emarginated first primaries. Present species is most closely allied with *P. merrilli*. Monotypic.

Distribution. Luzon (N Philippines).



Descriptive notes. 40 cm. Large, very colourful fruit-dove; forehead, crown, nape and malar area rusty carmine; ear-coverts black, forming large black patch on side of head; area between crown and black ear-patch rusty orange, freckled with black; throat orange-brown; sides of neck and breast pale grey, extending in narrow band over hindneck and in narrow strip between throat and carmine malar stripe; mantle, back and inner wing-coverts black shading to dark bronzy green on greater wing-coverts; crimson patch on each wing formed by hair-like fringes on outer webs of inner secondaries; large breast patch bright reddish orange

shading posteriorly into broad crimson border, followed by broad, poorly defined band of creamy white intermixed with grey; rest of underparts light grey with yellowish edging to some feathers; undertail-coverts appear spotted, with grey-green inner and buffy outer webs; rather long tail dark green with pale tip; bill red, tipped yellow; legs dark red. Female resembles male but with more pronounced green on rump, tail, tail coverts and wings. Juvenile generally dark bronzy green and paler greenish or grey, tipped with yellow where adult is grey; throat brown but lacks the red coloration, although crown feathers tipped rusty orange.

Habitat. Found in montane forest, especially primary forest, at altitudes of 500-2500 m.

Food and Feeding. No information available.

Breeding. Nesting apparently undescribed; an immature specimen taken in Dec appears to be the only information on timing of breeding.

Movements. No information available.

Status and Conservation. VULNERABLE. Rare and local, remaining fairly common only in small areas of primary forest above 850 m. Habitat loss and hunting are serious threats; still trapped and offered for sale in local markets. Considered by conservation groups in the Philippines to be endangered.

Bibliography. Alonzo-Pascolan (1992), Collar *et al.* (1994), Danielsen *et al.* (1994), Delacour & Mayr (1946), Dickinson *et al.* (1991), DuPont (1971), Manuel (1936c), McGregor (1909-1910), Peters (1938), Poulsen (1995), Rabor (1955), Zimmer (1918).

218. Cream-bellied Fruit-dove

Ptilinopus merrilli

French: Ptilope de Merrill **German:** Merrillfruchttaube **Spanish:** Tilopo de Merrill
Other common names: Merrill's/Cream-breasted Fruit-dove

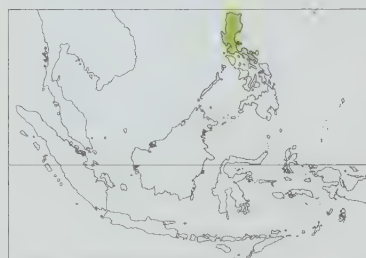
Taxonomy. *Leucotreron merrilli* McGregor, 1916, Laguna Province, Luzon.

Formerly placed in genus *Leucotreron*; a later proposal returned all members of that group to *Ptilinopus*, but placed present species in subgenus *Rhamphiculus* along with other Philippine and Sulawesi forms *P. marchei*, *P. occipitalis*, *P. fischeri*, *P. subularis* and *P. leclancheri*; characters of *Rhamphiculus* include relatively large size, and emarginated first primaries. Present species is most closely allied with *P. marchei*. Two subspecies recognized.

Subspecies and Distribution.

P. m. faustinoi (Manuel, 1936) - Mt Tabuan, Cagayan Province, N Luzon (N Philippines).

P. m. merrilli (McGregor, 1916) - mountains of E & S Luzon, Catanduanes and Polillo (N Philippines).



Descriptive notes. 38 cm. Large fruit-dove; general plumage deep green, shading to pale grey tinged with green on the head, neck and breast; throat whitish; grey of upper breast divided from creamy buff of lower breast and belly by narrow dark green band; flanks green; undertail-coverts and tibial feathers greenish with whitish tips; outer secondaries dark green with pale yellow edges to outer webs, primaries mostly greenish black; a patch on central secondaries formed by hair-like barbs, appearing purplish when viewed from side but bright crimson when viewed frontally; tail dark green with indistinct pale terminal band on outer feathers; underside of tail pale grey; bill red at base, dull yellow at tip; legs dark red. Sexes alike. Race *faustinoi* differs by having brownish red patch on crown.

Habitat. Primary and selectively logged forest from lowlands up to 1300 m.

Food and Feeding. Fruit; the only specific information is a record of species feeding on fruits of the small tree *Symplocos ahernii*.

Breeding. No information available.

Movements. No information available.

Status and Conservation. Not globally threatened. Currently considered near-threatened. Not officially listed as threatened at present, but probably at least vulnerable, based on combination of limited range in an area undergoing severe deforestation. Already listed as rare in 1946, and currently considered to be endangered by conservation groups in the Philippines. Research and survey work required.

Bibliography. Baud (1978), Danielsen *et al.* (1994), Delacour & Mayr (1946), Dickinson *et al.* (1991), DuPont (1971), Gonzales (1983), Hornskov (1992, 1996), Manuel (1936b, 1936c), McGregor (1916), Meyer de Schauensee & DuPont (1962), Peters (1938), Poulsen (1995).

219. Yellow-breasted Fruit-dove

Ptilinopus occipitalis

French: Ptilope batilde **German:** Gelbbrust-Fruchttaube **Spanish:** Tilopo Occipital
Other common names: Sulphur-breasted Fruit-dove, Yellow-breasted Fruit-pigeon

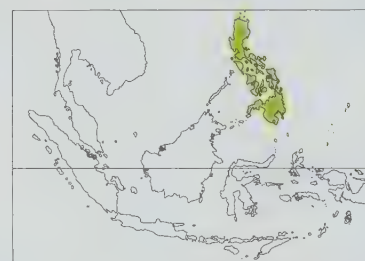
Taxonomy. *Ptilinopus* [sic] *occipitalis* G. R. Gray and Mitchell, 1844, Luzon.

Formerly placed in genus *Leucotreron*; a later proposal returned all members of that group to *Ptilinopus*, but placed present species in subgenus *Rhamphiculus* along with other Philippine and Sulawesi forms *P. marchei*, *P. merrilli*, *P. fischeri*, *P. subularis* and *P. leclancheri*; characters of *Rhamphiculus* include relatively large size, and emarginated first primaries. Present species is most closely allied to *P. fischeri*. Racial variation slight and probably clinal or not geographically correlated. Two subspecies tentatively recognized.

Subspecies and Distribution.

P. o. occipitalis G. R. Gray & Mitchell, 1844 - N & E Philippines from Luzon S to Visayas.

P. o. incognitus (Tweeddale, 1877) - mountains of Mindanao, SE Philippines.



Descriptive notes. 28-33 cm; male 204-278 g, female 209-254 g. Front of face, forehead, crown and sides of breast light bluish grey, tinged with yellow; cheeks, hindcrown, and nape dark purplish chestnut; central area of breast deep ochraceous yellow, with a broad band of deep crimson beneath; lower belly greyish; flanks, vent and undertail-coverts green and creamy white; upperparts dark green. Sexes alike. Juvenile lacks red and yellow markings; green and grey-green with yellow fringes to feathers of underparts. Race *incognitus* smaller, with throat more strongly washed yellow, underpart colours deeper, and red breast patch tending to be larger.

Habitat. Lowland and mid-elevation primary forest, up to 1800 m. Also frequents selectively logged forest.

Food and Feeding. No information available.

Breeding. Birds taken on Samar in Apr and May had enlarged gonads; a juvenile estimated to have hatched from egg laid in early Feb. In captivity: incubation 22 days; fledging 17 days.

Movements. No information.

Status and Conservation. Not globally threatened. Poorly known. Species reported to be common throughout much of range, but rare on Bohol and only recently discovered on Panay. Research required.

Bibliography. Bohmke (1993), Brooks, Dutson *et al.* (1996), Cain (1954a), Danielsen *et al.* (1994), Delacour & Mayr (1946), Dickinson *et al.* (1991), DuPont (1971, 1972b), DuPont & Rabor (1973b), Evans, Dutson & Brooks (1993), Gonzales (1983), Gonzales & Rees (1988), Goodman & Gonzales (1990), McGregor (1909-1910), Parkes (1960b, 1973), Peters (1938), Rand & Rabor (1960), Ripley & Rabor (1956).

220. Red-eared Fruit-dove

Ptilinopus fischeri

French: Ptilope de Fischer **German:** Rotohr-Fruchttaube **Spanish:** Tilopo de Fischer
Other common names: Fischer's Fruit-dove

Taxonomy. *Ptilinopus Fischeri* Brüggemann, 1876, near Menado, Sulawesi.

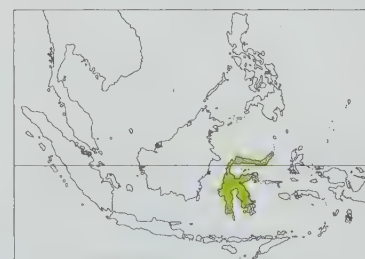
Formerly placed in genus *Leucotreron*; a later proposal returned all members of that group to *Ptilinopus*, but placed present species in subgenus *Rhamphiculus* along with other Philippine and Sulawesi forms *P. marchei*, *P. merrilli*, *P. occipitalis*, *P. subularis* and *P. leclancheri*; characters of *Rhamphiculus* include relatively large size, and emarginated first primaries. Present species is most closely allied to *P. occipitalis*. Three subspecies recognized.

Subspecies and Distribution.

P. f. fischeri Brüggemann, 1876 - N Sulawesi.

P. f. centralis (A. B. Meyer, 1903) - mountains of C & SE Sulawesi.

P. f. meridionalis (A. B. Meyer & Wigglesworth, 1893) - Lompobattang Massif in SW Sulawesi.



Descriptive notes. 35-37 cm; 177 g. Head pale grey; dark crimson patch on each side of head connected across nape by a black band; breast and sides of neck pale grey grading to dark grey on hindneck and upper mantle; upperparts green; outer secondaries with yellow fringes on outer webs; lower breast and belly pale gold, or greenish gold; vent, leg feathers and undertail-coverts mottled greyish green and cream; uppertail rather dark green, the outer feathers black and green with broad light grey terminal bands; undertail blackish with broad pale grey terminal band; bill green; legs purplish. Sexes alike. Juvenile lacks black nuchal

band, has grey areas tinged with green, and red face patch much duller and less well defined. Race *meridionalis* has upperparts greyish black, and lower breast and belly grey with yellow on feather tips; race *centralis* has dark grey mantle and green lower back.

Habitat. Mountain and moss forest at altitude range of 1000-3000 m, rarely below 2000 m. Persists in recently logged areas.

Food and Feeding. Forages in the subcanopy.

Breeding. Eggs reported from Oct in N Sulawesi, and Feb-Mar in C Sulawesi. Nest consists of a few interlaced twigs, usually low down; one nest located under the root of an old tree on a mountainside, containing 1 egg.

Movements. No information.

Status and Conservation. Not globally threatened. Very little information; no details available, but species appears to be generally rather uncommon. Records from recently logged forest suggest species may be relatively adaptable and less seriously threatened by logging activities than many forest birds, but this requires confirmation. Extensive research required.

Bibliography. Andrew (1992), Cain (1954a), Coates & Bishop (1997), Gibbs (1990), Holmes & Philipps (1996), Meise (1931), Peters (1938), Rozendaal & Dekker (1989), Stresemann (1941), Sujatnika *et al.* (1995), Watling (1983), White & Bruce (1986), Whitten *et al.* (1987).

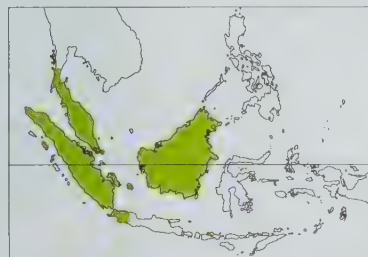
221. Jambu Fruit-dove

Ptilinopus jambu

French: Ptilope jambou **German:** Jambufruchttaube **Spanish:** Tilopo Jambú
Other common names: Pink-headed(!)/Crimson-headed Fruit-dove, Jambu Fruit-pigeon

Taxonomy. *Columba Jambu* J. F. Gmelin, 1789, Java (= Sumatra?). A distinctive form of uncertain affinities; it has some characters of all three of the subgenera *Ptilinopus*, *Leucotreron* and *Rhamphiculus*, and was tentatively placed in subgenus *Ptilinopus*; within that subgenus it was assigned to its own species-group, perhaps most closely allied to *P. melanospila*. More recent opinion considers present species to be closer to birds grouped in subgenera *Leucotreron* and *Rhamphiculus*. Proposed alteration of type locality seems to have been based on idea that species did not occur in Java. Monotypic.

Distribution. Peninsular Thailand and Malaysia through Sumatra (including Riau Archipelago, Nias, Bangka, Belitung) to Borneo and W Java.



Descriptive notes. 22-28 cm. Face, forehead and forecrown pinkish crimson; narrow black throat patch; nape and upperparts green; underparts creamy white with large pink breast patch and chestnut undertail-coverts; primaries blackish green; outer secondaries and some primaries have narrow yellow fringes; outer tail feathers dark green with paler terminal band that is light green on outer webs and pale grey on inner webs; undertail dark grey with pale grey terminal band; bill yellow or orange; legs dark red. Female has face dull purple; underparts green with white belly; brownish undertail-coverts. Juvenile very like female, but

young males soon moult into adult plumage.

Habitat. Forest and wooded areas, including mangroves; in Indonesia reported to favour small islands, and to fly from island to island; a lowland species reported up to 1500 m on Borneo and Sumatra.

Food and Feeding. No precise information. Has been reported to feed on the ground on fruits knocked down by monkeys and hornbills; probably usually feeds on fruits and berries in the branches.

Breeding. Known to breed Nov-Feb and Jul. Nest of typical pigeon type placed in a tree or shrub. Lays 1 white egg; incubation by both parents for at least 10 days.

Movements. At least partly migratory; may migrate regularly between Peninsular Malaysia and Sumatra. A bird ringed near Selangor (W Malaysia) was recovered 2 years later 246 km NW of where it was ringed; another found 800 km away in Sumatra. During periods of migration or nomadism, particularly in Aug-Dec, may strike lighthouses and appear on ships and in cities.

Status and Conservation. Not globally threatened. No precise details available. Species reported to be locally common in Borneo and Sumatra; very rare in W Java. Research and survey work recommended.

Bibliography. Bent (1994), Blaszkewitz (1995), Cain (1954a), Hellebrekers & Hoogerwerf (1967), Lekagul & Round (1991), MacKinnon (1988), MacKinnon & Philipps (1993), Madoc (1976), van Marle & Voous (1988), Medway & Wells (1976), Nash & Nash (1988), Roberts, H. (1990, 1991), Robinson & Chasen (1939), Rutgers & Norris (1970), Smythies (1981), Thiollay (1995), Wells (1990).

222. Maroon-chinned Fruit-dove

Ptilinopus subgularis

French: Ptilope à mentonnière **German:** Braunkinn-Fruchttaube **Spanish:** Tilopo Barbioscuro
Other common names: Dark-chinned Fruit-dove

Taxonomy. *Ptilopus subgularis* A. B. Meyer and Wilesworth, 1896, Peleng and Banggai. Formerly placed in genus *Leucotreron*; a later proposal returned all members of that group to *Ptilinopus*, but placed present species in subgenus *Rhamphiculus* along with other Philippine and Sulawesi forms *P. marchei*, *P. merrilli*, *P. occipitalis*, *P. fischeri* and *P. leclancheri*; characters of *Rhamphiculus* include relatively large size, and emarginated first primaries. Present species forms a superspecies with *P. leclancheri*. Original species name *gularis* (of Sulawesi) is preoccupied, so *subgularis* becomes the specific name, as the next oldest available, and *epia* becomes the name for Sulawesi birds. Three subspecies recognized.

Subspecies and Distribution.

P. s. epia (Oberholser, 1918) - Sulawesi.

P. s. subgularis (A. B. Meyer & Wilesworth, 1896) - Banggai Is (Peleng and Banggai).

P. s. mangoliensis Rothschild, 1898 - Sula Is (Mangole and Taliabu).



Descriptive notes. 33-36 cm; 142 g. Head, neck and most of underparts silvery grey tinged with greenish yellow on hindneck; small patch on upper throat dark chestnut; large buff patch on lower breast, flanks green; undertail-coverts and vent dark chestnut; tibial feathers chestnut and grey-green; upperparts green, darker and bluer on primaries; tail has indistinct narrow pale terminal bar; bill yellow; legs red or purplish red. Female similar to male but with more green on neck. Juvenile greener on crown and hindneck; chin patch paler; breast patch reduced; undertail-coverts paler. Race *epia* has less greenish yellow on hindneck, larger buff breast patch and paler undertail-coverts; *mangoliensis* lacks breast spot, has greener nape, and underside with broad greenish yellow feather tips.

Habitat. Dense primary and secondary forest at low elevations, up to 800 m. Apparently prefers secondary forest on Taliabu.

Food and Feeding. Known to take fruits from the branches. No other information.

Breeding. No information available.

Movements. No information available.

Status and Conservation. Not globally threatened. Very little information available. Moderately common in S & E Sulawesi, and common on Taliabu; relative paucity of observations probably in part due to retiring habits of species. Research required.

Bibliography. Andrew (1992), Cain (1954a), Coates & Bishop (1997), Davidson *et al.* (1995), Gibbs (1990), Holmes & Philipps (1996), Peters (1938), Ripley (1941), Rozendaal & Dekker (1989), Stresemann (1941), Sujatnika *et al.* (1995), Watling (1983), White & Bruce (1986), Whitten *et al.* (1987).

223. Black-chinned Fruit-dove

Ptilinopus leclancheri

French: Ptilope de Leclancher **German:** Schwarzkinn-Fruchttaube **Spanish:** Tilopo Barbinegro
Other common names: Black-throated Fruit-dove, Leclancher's Pigeon

Taxonomy. *Trerolaema leclancheri* Bonaparte, 1855, New Guinea; error = Philippines.

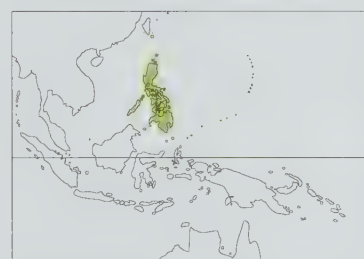
Formerly placed in genus *Leucotreron*; a later proposal returned all members of that group to *Ptilinopus*, but placed present species in subgenus *Rhamphiculus* along with other Philippine and Sulawesi forms *P. marchei*, *P. merrilli*, *P. occipitalis*, *P. fischeri* and *P. subgularis*; characters of *Rhamphiculus* include relatively large size, and emarginated first primaries. Present species forms a superspecies with *P. subgularis*. Three subspecies recognized.

Subspecies and Distribution.

P. l. longialis (Manuel, 1936) - Lan Hsü Is (SE of Taiwan) and Batan, Calayan and Camiguin Norte (N Philippines).

P. l. leclancheri (Bonaparte, 1855) - most of Philippine Is, except Palawan, Basilan and Sulu Archipelago.

P. l. gironieri (J. Verreaux & Des Murs, 1862) - Palawan (SW Philippines).



Descriptive notes. 26-28 cm; male 174 g, female 153-159 g. Head, neck and breast silvery grey, tinged with green on nape and hindneck; chin patch black; grey breast divided from dull green belly by a broad blackish chestnut band; ventral area paler; undertail-coverts light chestnut; upperparts emerald-green with narrow yellow fringes to outer secondaries; primaries blackish green with conspicuous yellow edges to outer webs; bill yellow, base of lower mandible dark red; legs dark red. Female green with grey wash on forehead and throat; chin patch brownish black; narrow band on lower breast is dark brown, below which feathers are mottled green, pale grey and buff. Juvenile resembles female but lacks pectoral band and has only a faint dark smudge on throat. Races differ only rather slightly in size and colour tone.

Habitat. Inhabits forest and dense second growth in the lowlands up to at least 700 m.

Food and Feeding. Known to feed on fruit taken from the branches, but no precise information available.

Breeding. Nests with eggs have been found on Luzon in Apr. and on Camiguin Norte in Jun and Jul. Typical pigeon nest in shrub or tree 1.5-4.5 m above ground. Lays 1 white egg.

Movements. No information.

Status and Conservation. Not globally threatened. Fairly widely distributed, but considered to be generally uncommon on most islands in its range; however, its retiring behaviour may, in part, have contributed to the paucity of records. Research required.

Bibliography. Alcalá & Sanguila (1969), Alonzo-Pascolan (1992), Brooks, Dutson *et al.* (1996), Cain (1954a), Daniels *et al.* (1994), Delacour & Mayr (1946), Dickinson *et al.* (1991), DuPont (1971, 1980), DuPont & Rabor (1973b), Evans, Dutson & Brooks (1993), Gonzales & Rees (1988), Goodman & Gonzales (1990), Hachisuka (1941), Manuel (1936c), Manuel & Gilliard (1952), McClure (1974), McGregor (1907, 1909-1910), Meyer de Schauensee & DuPont (1962), Parkes (1965a), Peters (1938), Rand & Rabor (1960), Ripley (1952), Wolfe (1938).

224. Scarlet-breasted Fruit-dove

Ptilinopus bernsteinii

French: Ptilope à poitrine écarlate **German:** Scharlachbrust-Fruchttaube **Spanish:** Tilopo de Bernstein

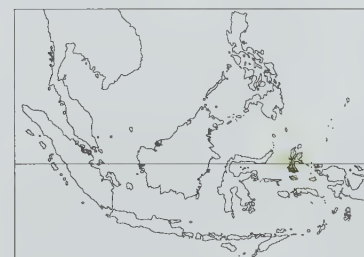
Taxonomy. *Ptilopus bernsteinii* Schlegel, 1863, Bacan.

Formerly placed in the genus *Megaloprepia* along with *P. magnificus*; when *Megaloprepia* was merged with *Ptilinopus*, the previous species name, *formosus*, became preoccupied, and so was replaced by current name. Present species is closest to *P. magnificus*; affinities have also been suggested with *P. subgularis* and *P. leclancheri*. Two subspecies recognized.

Subspecies and Distribution.

P. b. bernsteinii (Schlegel, 1863) - Halmahera, Ternate and Bacan (N Moluccas).

P. b. micrus (Jany, 1955) - Obi (NC Moluccas).



Descriptive notes. 28-29 cm. Mainly rich green, shading to a paler duller green on neck and breast; head pale yellowish grey shading into green of neck; a patch of bright scarlet in middle of green lower breast; belly deep buffy yellowish gold shading into golden yellow on underwing-coverts; undertail-coverts chestnut; tail fairly long and broad. Female lacks scarlet breast patch and has a pale greyish green head. Race *micrus* differs only in smaller size and relatively shorter tail.

Habitat. Primary forest, adjacent secondary growth and dense bamboo stands, from lowlands up to the highest peaks; on Obi recorded

from 180 up to 600 m; on Halmahera up to 1200 m; and on Bacan at 1500-2150 m.

Food and Feeding. No information available.

Breeding. Two nests with eggs were found in Jul; another with a young nestling was found in late Apr. Nest is a typical dove platform of twigs; two of three nests found were on fern leaves, quite low down, the other was in a small tree. Lays 1 white egg.

Movements. No information.

Status and Conservation. Not globally threatened. Uncommon to moderately common on Halmahera; rare to absent in lowlands, at least nowadays, on Bacan and Obi. Probably under-recorded because of its retiring habits.

Bibliography. Andrew (1992), Coates & Bishop (1997), Gibbs (1990), Heinrich (1956), Lambert (1994b), Lambert & Young (1989), Sujatnika *et al.* (1995), White (1977), White & Bruce (1986).



225. Wompoo Fruit-dove

Ptilinopus magnificus

French: Ptilope magnifique **German:** Purpurbrust-Fruchttaube **Spanish:** Tilopo Magnífico
Other common names: Magnificent/Purple-breasted Fruit-dove; Wompoo/Purple-bellied/King Pigeon/Fruit-pigeon

Taxonomy. *Columba magnifica* Temminck, 1821, New South Wales. Formerly placed in genus *Megaloprepia*, most closely allied to *P. bernsteinii*; affinities have also been suggested with *P. subgularis* and *P. leclancheri*. Most of accepted races are poorly defined, and variation clinal. Eight subspecies recognized.

Subspecies and Distribution.

P. m. alaris (Stresemann & Paludan, 1932) - W Papuan Is, on Waigeo, Misool, Batanta and Salawati.

P. m. puella (Lesson, 1827) - Vogelkop (NW New Guinea).

P. m. interposita (Hartert, 1930) - S part of Geelvink Bay, Onin Peninsula, lower Snow Mts and E along S coast of New Guinea to R Eilanden.

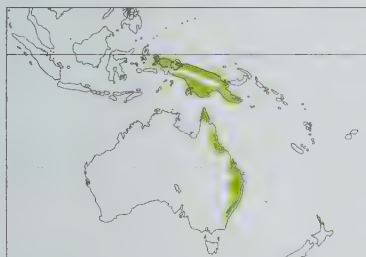
P. m. septentrionalis (A. B. Meyer, 1893) - N New Guinea from R Memberamo E to Astrolabe Bay, and islands of Yapen, Kairiru, Manam, Karkar and Bagabag.

P. m. poliura (Salvadori, 1878) - SE New Guinea from Huon Gulf and R Edrich eastwards.

P. m. assimilis (Gould, 1850) - Cape York region (N Queensland).

P. m. keri (Mathews, 1912) - Bellenden Ker Range (NE Queensland).

P. m. magnificus (Temminck, 1821) - S Queensland and New South Wales.



Descriptive notes. 29-45 cm; 250-500 g. Large and long-tailed; head and neck grey to greenish grey; mantle, rump and uppertail-coverts bright green with yellow tinge; wings mostly green, with yellow patches on central secondary-coverts forming a broken wing-bar on folded wing; narrow purple strip in centre of throat, broadening down neck; breast and upper belly deep purple; lower belly, vent and undertail-coverts mostly golden yellow; undertail pale grey; wing lining mostly orange-yellow, with some chestnut on greater primary-coverts; inner primaries green, outer ones greenish grey, grading to chestnut at base; bill orange-red with yellow tip; legs yellow-green. Sexes alike. Juvenile similar to adult, but with dull green cap and hindneck; duller and less extensive purple on underparts; and duller yellow on lower belly; bill dull yellow with orange base. Races vary in size and coloration, especially on the breast and under side of tail; race *puella* among smallest, with a brighter, redder breast.

Habitat. Inhabits a variety of forest types: primary and well developed secondary rain forest, gallery forest and monsoon forest. In New Guinea, occurs from near sea-level up to 1400 m; commonest at lower elevations. In fragmented habitat in northern New South Wales is sometimes found in eucalypt forest and farmland in winter; this indicates the ability of the species to cross open country and use degraded habitat and native habitat other than rain forest.

Food and Feeding. Frugivorous; eats a wide variety of fruits; a study in Papua New Guinea documented over 50 species of fruit in diet; most important plant families were figs (Moraceae), laurels (Lauraceae), palms (Arecaceae) and Annonaceae; figs and laurels were also very important in the diet of Australian populations, as were Elaeocarpaceae. This broad diet is probably an important factor in allowing the species to be generally sedentary. Feeds at all levels of the forest from understorey to canopy, but probably most frequently in mid-levels and lower canopy. Typically feeds singly or in pairs; sometimes in small flocks.

Breeding. Mainly from middle of dry season to early wet season in both Papua New Guinea and E Australia, though some breeding probably occurs all year round. Nest is somewhat larger version of the typical *Ptilinopus* platform of twigs and vine tendrils, average diameter in Australia 150 mm; placed on horizontal fork or palm frond, 3.6-7.6 m up; egg can usually be seen through nest from below. Time between nest completion and egg-laying highly variable, and may be as long as a month and a half. Lays 1 white egg; incubation period not determined exactly, but not less than 21 days; male incubates in day, female at night; if brooding bird disturbed, it usually falls almost vertically from nest and flies clumsily away, close to ground, undoubtedly a distraction display; fledging period in excess of 13-14 days. Nesting success reported to be very low in Papua New Guinea due to high predation.

Movements. In E Australia, some populations are sedentary; others undertake widespread movements in response to distribution of ripening fruit crops. Flight rapid but quite heavy, typically below canopy.

Status and Conservation. Not globally threatened. Remains widespread and common to fairly common in many areas. However, the southernmost race, nominate *magnificus*, has declined severely and is now extinct through much of its former range due to habitat loss and overhunting; its most important stronghold is in the Border Ranges of S Queensland and N New South Wales; New South Wales population is estimated at over 7000 birds.

Bibliography. Beehler *et al.* (1986), Blakers *et al.* (1984), Coates (1985), Crome (1975a), Date, Ford & Recher (1991), Date, Recher & Ford (1992), Diamond (1972a), Frith, H.J. (1977, 1982), Frith, H.J., Braithwaite & Wolfe (1974), Frith, H.J., Crome & Wolfe (1976), Goodwin (1959a), Gosper (1994), Higgins & Davies (1996), Innis (1989), Mayr & Rand (1937), Mees (1982a), Rand (1942a), Ripley (1964), Roberts (1994a, 1994b), Rutgers & Norris (1970), Safford & Atwood (1996).

226. Pink-spotted Fruit-dove

Ptilinopus perlatus

French: Ptilope perlé **German:** Perlenfruchttaube **Spanish:** Tilopo Perlado
Other common names: Pink-spotted Fruit-pigeon

Taxonomy. *Columba perlata* Temminck, 1835, Lobo Bay, New Guinea.

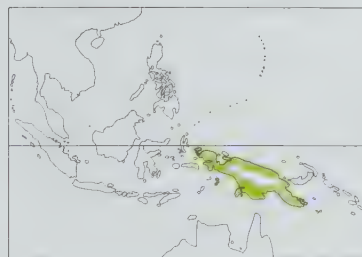
Very closely related to extensively sympatric *P. ornatus*, although the two species tend to be ecologically separated; other members of species-group are *P. tannensis*, *P. aurantiifrons*, *P. wallacii* and, in some accounts, *P. superbus*. Three subspecies recognized.

Subspecies and Distribution.

P. p. perlatus (Temminck, 1835) - W Papuan Is (Waigeo, Salawati), NW New Guinea (E to R Memberamo and Triton Bay) and Yapen.

P. p. plumbeicollis (A. B. Meyer, 1890) - NE New Guinea from Astrolabe Bay to Huon Gulf.

P. p. zonurus (Salvadori, 1876) - Aru Is and S New Guinea (along coast from base of Snow Mts) to Fergusson I and Goodenough I.



Descriptive notes. 25-27 cm; 245-257 g. Head greenish yellow with an olive tinge, narrowly bordered at nape with bronzy gold and separated from green upperparts by a pale bluish grey collar, which is contiguous with whitish grey of throat and malar region; extreme upper breast and narrow margin to grey collar golden bronze; lower breast and belly dark yellowish green; upperparts green, more or less bronze-tinged; bright pink centres of many lesser wing-coverts and scapulars form extensive pink spotting on inner part of closed wing; secondaries and greater-coverts darker, more bluish green with narrow yellow edges to outer

webs; undertail-coverts whitish, marked sparsely with greyish green; bill yellow horn to yellow-olive or dark greenish yellow; legs dark red. Sexes alike. Juvenile plumage apparently undescribed. Race *zonurus* has pale greenish silver terminal tailband; *plumbeicollis* has grey head.

Habitat. Frequents forest edge, disturbed and partly cleared areas, rain forest, monsoon forest and gallery forest. Occurs mainly in lowlands and hills, locally in lower mountains up to 1220 m. In contrast to closely related *P. ornatus*, most frequently found in lowland secondary forest, not medium altitude primary forest.

Food and Feeding. Feeds primarily on figs (Moraceae), and to a much lesser extent on the fruits of Annonaceae and Lauraceae. Typically feeds in flocks, which may number hundreds in large fruiting trees.

Breeding. Morphological data suggest species capable of breeding all year round; the few nests reported were found in Jun and Aug. Nest is a thin platform of twigs, typical of the genus; one was 3 m up in a thin sapling; the fact that nests of this species have rarely been found may perhaps indicate that they are often placed high in trees. Lays 1 white egg.

Movements. A nomadic, flocking species; numbers fluctuate in association with availability of fruit at fruiting trees. In a study near Port Moresby, most birds left the area Jun-Aug, in the middle of the dry season.

Status and Conservation. Not globally threatened. No precise details available, but species generally reckoned to be fairly common, locally abundant; one of commonest *Ptilinopus* in New Guinea. Research required.

Bibliography. Andrew (1992), Bailey (1992a), Beehler (1978b), Beehler *et al.* (1986), Bell (1969b, 1982), Cain (1954a), Coates (1985), Diamond (1972a, 1975c), Frith, Braithwaite & Wolfe (1974), Frith, Crome & Wolfe (1976), Gregory (1995a, 1995b), Ogilvie-Grant (1915), Rand (1942a), Rand & Gilliard (1967), Ripley (1964), Vella (1996), Wahlberg (1992), Watson *et al.* (1962).

227. Ornate Fruit-dove

Ptilinopus ornatus

French: Ptilope orné **German:** Schmuckfruchttaube **Spanish:** Tilopo Adornado
Other common names: Gestroi's Fruit-dove

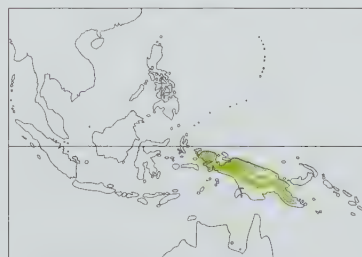
Taxonomy. *Ptilopus ornatus* Schlegel, 1873, interior of north-west peninsula of New Guinea.

Very closely related to the largely sympatric *P. perlatus* although the two species tend to be ecologically separated; other members of the species-group are *P. tannensis*, *P. aurantiifrons*, *P. wallacii* and, in some accounts, *P. superbus*. Two subspecies recognized.

Subspecies and Distribution.

P. o. ornatus (Schlegel, 1873) - Arfak Mts and coast of Vogelkop between Amberbaki and Warbusi (NW New Guinea).

P. o. gestroi D'Albertis & Salvadori, 1875 - New Guinea from Cyclops Mts and Onin Peninsula eastwards.



Descriptive notes. c. 25 cm; 163 g. Colour pattern fairly similar to the closely related *P. perlatus*, but pale grey of throat and collar less extensive, and golden colour of upper breast more extensive; bronzy brown of breast darker; no pink spots on wings, but a dark purple patch on "shoulder", a less well defined silver-grey patch below; crown and ear-coverts dark purple; scapulars golden green with pale grey centres forming pale, spotted effect; terminal tail band strongly tinged with yellow. Sexes alike. Juvenile duller than adult, with purple shoulder patch much reduced. Race *gestroi* has crown and ear-coverts mustard yellow.

Habitat. Inhabits primary rain forest and nearby disturbed areas; found primarily within altitude range of 200-1350 m, but apparently nomadic and occurs locally in the lowlands and up to 2500 m in moss forest. Although sometimes found with the very similar *P. perlatus*, present species typically occurs in hills and in primary forest, while latter is found mostly in forest-edge habitats in the lowlands.

Food and Feeding. Frugivorous; ten birds collected near Port Moresby had eaten only figs (*Ficus*, Moraceae) of several species. Often feeds in flocks, which may number 50 birds or more; associates with other species at fruiting trees.

On following pages: 228. Tanna Fruit-dove (*Ptilinopus tannensis*); 229. Orange-fronted Fruit-dove (*Ptilinopus aurantiifrons*); 230. Wallace's Fruit-dove (*Ptilinopus wallacii*); 231. Superb Fruit-dove (*Ptilinopus superbus*); 232. Many-coloured Fruit-dove (*Ptilinopus perousii*); 233. Purple-capped Fruit-dove (*Ptilinopus porphyraceus*); 234. Palau Fruit-dove (*Ptilinopus pelewensis*); 235. Rarotonga Fruit-dove (*Ptilinopus rarotogensis*); 236. Mariana Fruit-dove (*Ptilinopus roseicapilla*); 237. Rose-crowned Fruit-dove (*Ptilinopus regina*); 238. Silver-capped Fruit-dove (*Ptilinopus richardsii*).

Breeding. Nesting and associated behaviour reported in Oct. One nest, typical of genus, was placed in a dense tangle 3 m up in sub-stage tree. Species is reported to be solitary nester in mossy forest at high elevations.

Movements. Apparently nomadic; however, some birds may be found most months of the year in a given area.

Status and Conservation. Not globally threatened. Little precise information available, but species described as being common in many areas, and even locally abundant.

Bibliography. Andrew (1992), Bailey (1992a), Beehler (1978b), Beehler *et al.* (1986), Bellchambers *et al.* (1994), Cain (1954a), Coates (1985), Coles (1995), Diamond (1972a, 1975c), Frith, Crome & Wolfe (1976), Gregory (1995a, 1995b), Hiaso *et al.* (1994), Mayr & Rand (1937), Ogilvie-Grant (1915), Rand (1942a), Rand & Gilliard (1967), Rutgers & Norris (1970).

228. Tanna Fruit-dove

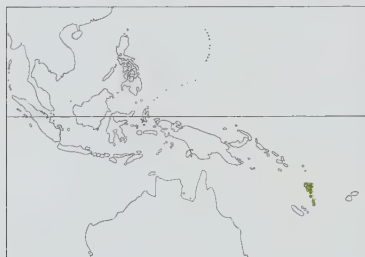
Ptilinopus tannensis

French: Pitlope de Tanna **German:** Silberfleck-Fruchttaube **Spanish:** Tilopo de Tanna
Other common names: Silver-shouldered/Vanuatu/Yellow-headed/New Hebrides Fruit-dove

Taxonomy. *Columba tannensis* Latham, 1790, Tanna, Vanuatu.

Usually considered to form a species-group with *P. perlatus*, *P. ornatus*, *P. aurantiifrons*, *P. wallacii* and, in some accounts, *P. superbus*. Monotypic.

Distribution. Vanuatu, including Banks Is.



Descriptive notes. 28-30 cm. Forehead, crown and face dark greenish yellow shading into dark green of rest of plumage; yellow tips or fringes to outer webs of most greater-coverts and secondaries form two yellow patches on wing; innermost lesser wing-coverts silvery white edged green, forming a patch of silver spots on "shoulder"; central tail feathers green with indistinct silvery green subterminal band; outer ones bright dark green with clearer silvery subterminal bands; broad yellow tips to feathers of vent and undertail-coverts; bill bluish grey; legs purplish red. Female lacks silver spots on lesser wing-coverts and has more

white, less yellow, on lower belly. Juvenile green with yellow fringes to all feathers, forming a scaly effect.

Habitat. Favours primary and well developed secondary forest, but may be found in almost any wooded habitat, including plantations and gardens, provided there are some tall fruit-bearing trees remaining. Primarily a lowland species, occasionally found up to 500 m.

Food and Feeding. Frugivorous; common food plants include large strangler-figs (Moraceae) and mahogany trees (*Dysoxylum*, Meliaceae); fruits of vines and probably palms are also taken. Feeds mainly in the canopy, singly, in pairs or in small groups; usually remains in dense foliage where it is difficult to see.

Breeding. Nests with eggs have been found in Apr. and fully feathered nestlings at end of May, but breeding season is probably extended; there may be more than one brood in the season. Nest is a flimsy platform of thin, loosely interwoven twigs, built in a horizontal fork; most nests are high up in trees. Lays 1 white egg; both adults incubate and care for the young.

Movements. Locally nomadic in response to ripening of fruit crops; probably also travels between islands.

Status and Conservation. Not globally threatened. Currently considered near-threatened. Latest information reported species to be only moderately common; could soon become threatened as a result of habitat loss. Species should probably be fully protected from hunting; at present there is a legal hunting season.

Bibliography. Amadon (1943), Bregulla (1992), Cain (1954a), Dahl (1986), Mayr (1945b).

229. Orange-fronted Fruit-dove

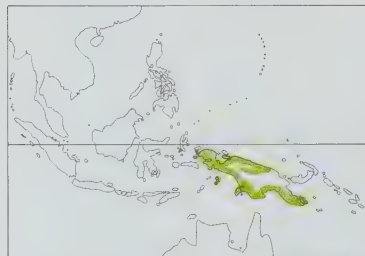
Ptilinopus aurantiifrons

French: Pitlope à front d'or **German:** Goldstirn-Fruchttaube **Spanish:** Tilopo Frentiáureo
Other common names: Golden-fronted Fruit-dove; Yellow-fronted Fruit-pigeon

Taxonomy. *Ptilinopus* [sic] *aurantiifrons* G. R. Gray, 1858, Aru Islands.

Generally placed in a species-group with *P. perlatus*, *P. ornatus*, *P. tannensis*, *P. wallacii* and, according to some authorities, *P. superbus*. Monotypic.

Distribution. W Papuan Is (Misool, Batanta, Salawati). Yapen and Aru Is through coastal New Guinea (except NE, from Madang to Huon Gulf) to D'Entrecasteaux Is.



Descriptive notes. 22-23 cm; 136 g. Forehead bright orange or orange-yellow; throat and lower part of face white; crown, nape and upper part of face green with bronzy tinge; upper breast blue-grey, extending in a band around neck; ventral regions pale yellowish green; undertail-coverts creamy white and dull green; rest of plumage green with bronzy tinge, except on dark green primaries and outer secondaries; bluish grey bases to feathers form spots on wing-coverts and upper mantle; outer tail feathers tipped grey and white on inner webs; bill red at base, yellow to greenish yellow for rest of length; legs bright purple-red.

Female duller. Juvenile plumage apparently undescribed.

Habitat. Inhabits secondary forest and forest edge, littoral woodland, mangroves, gallery forest, savanna and towns; often frequents fig trees; occasionally in primary rain forest. Found from sea-level up to 300 m.

Food and Feeding. Frugivorous; feeds on a variety of species; in a study near Port Moresby, the most important plant families were Moraceae, Combretaceae and Arecaceae. Often seen in flocks; also feeds singly and in pairs.

Breeding. Scattered breeding records in Papua New Guinea indicate that nesting occurs from middle of dry season to early wet season at least, Sept-Apr; nest with egg in late Mar at Bintuni Bay (S

Vogelkop). Nest somewhat more substantial than typical for genus, placed in a tree or shrub 2-4-4-6 m up; one small nest found in low *Sonneratia caseolaris* mangrove. Lays 1 white egg; incubating or brooding adults do not sit tightly, flushing when an observer approaches to within 50 m.

Movements. Little information, but species is apparently sedentary. Flight swift and direct.

Status and Conservation. Not globally threatened. Few details available. Species is described as being generally fairly common, locally abundant. Adapts to a variety of secondary habitats, including towns.

Bibliography. Andrew (1992), Beehler *et al.* (1986), Cain (1954a), Coates (1985), Erftemeijer *et al.* (1991), Frith, Crome & Wolfe (1976), Halliday (1992), Mayr & Rand (1937), Mees (1982a), Ogilvie-Grant (1915), Rand (1942a), Rand & Gilliard (1967), Ripley (1964), Rutgers & Norris (1970).

230. Wallace's Fruit-dove

Ptilinopus wallacii

French: Pitlope de Wallace **German:** Weißkehl-Fruchttaube **Spanish:** Tilopo de Wallace
Other common names: Golden-shouldered/Crimson-capped/Wallace's Green Fruit-dove, Wallace's Fruit-pigeon

Taxonomy. *Ptilinopus* [sic] *Wallacii* G. R. Gray, 1858, Aru Islands.

Placed in a species-group with *P. perlatus*, *P. ornatus*, *P. tannensis*, *P. aurantiifrons* and, in some accounts, *P. superbus*. Monotypic.

Distribution. S Moluccas (Banda, Kur, Manggur, Taam, Komeer, Bacer, Kai), E Lesser Sundas (Babar, Tanimbar) and Aru Is to SW New Guinea (R Mimika to R Noord).



Descriptive notes. 24-28 cm. Forehead and crown dull crimson; lower part of face and throat white; rest of head, neck, breast and upper mantle pale bluish grey; large orange belly patch separated from grey of breast by a white band; flanks, ventral regions and undertail-coverts pale yellow and greenish; golden bronze patch on carpal region of wing; mantle and inner wing-coverts bluish grey, edged with yellow or bronzy green forming a scaly effect; primaries and secondaries dark glossy green; secondaries and greater-coverts with narrow yellow fringes; back, rump and uppertail-coverts yellowish green; central tail

feathers green with pale terminal band; outer ones darker with greyish white terminal band; bill yellow or greenish yellow with paler tip; legs purple or pinkish. Female has orange belly patch less intense, and grey areas tinged with green. Juvenile has red cap edged and intermixed with dark green; feathers of mantle and wing-coverts glossy green with yellow tips; grey of breast and orange of belly more or less suffused with green.

Habitat. Lowland forest near rivers or along the coast, mangroves, forest edge, adjacent savanna and agricultural areas; apparently able to adapt to secondary forest based on its presence on heavily populated islands. Recorded from sea-level up to c. 250 m on Kai Besar.

Food and Feeding. Takes berries and small fruits directly from the branches of trees.

Breeding. No information available.

Movements. Infrequent occurrence of the species on mainland New Guinea suggests that it may wander widely.

Status and Conservation. Not globally threatened. Very little information available; species is said to be fairly common in Tanimbar and Aru Is; and moderately common to common in Kai Is. Its continued survival on heavily populated islands suggests that it may be able to adjust somewhat to disturbed habitats.

Bibliography. Andrew (1992), Beehler *et al.* (1986), Cain (1954a), Coates & Bishop (1997), Diamond & Bishop (1994), Hartert (1901), Rand & Gilliard (1967), Rutgers & Norris (1970), Sujatnika *et al.* (1995), White & Bruce (1986).

231. Superb Fruit-dove

Ptilinopus superbus

French: Pitlope superbe **German:** Prachtfuchttaube **Spanish:** Tilopo Soberbio
Other common names: Purple-capped(!)/Purple-crowned Fruit-dove, Purple-crowned Pigeon, Superb Fruit-pigeon

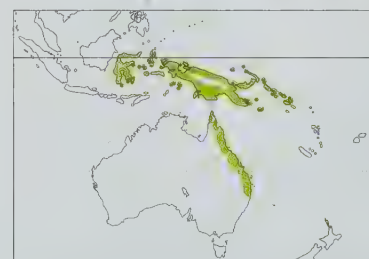
Taxonomy. *Columba Superba* Temminck, 1810, Halmahera.

Affinities uncertain; considered by some to be most closely related to *P. perousii*, and allied to the large *P. purpuratus* species-group; alternative treatment places present species with the species-group that includes *P. perlatus*, *P. ornatus*, *P. tannensis*, *P. aurantiifrons* and *P. wallacii*. Two subspecies recognized.

Subspecies and Distribution.

P. s. temminckii (Des Murs & Prévost, 1849) - Sulawesi and Sulu Is.

P. s. superbus (Temminck, 1810) - Moluccas, W Papuan Is and Aru Is through New Guinea to Admiralty Is and Bismarck Archipelago, D'Entrecasteaux Is and Louisiade Archipelago, and on to Solomon Is (E to Malaita) and S to E Australia (Torres Strait Is and Cape York to N New South Wales).



Descriptive notes. 21-24 cm; 80-145 g. Crown to nape and upper lores purple; lower lores, malar area, chin and throat pale greyish white, rest of sides of head green; broad red-brown half-collar across hindneck and upper mantle; upperparts olive-green, with large blue-black spots on scapulars and inner coverts and large blue-black patch at carpal joint; primaries grey-black, with pale edges, outer secondaries grade inward to mostly green tertials, all with fine yellow edges; lower breast whitish, divided by a broad blue-black band from belly and flanks, which are white with dark green patches at sides; uppertail green with broad grey-green tip; bill

greenish grey; legs red. Female much less colourful; head, neck and upperparts green with small blue-black patch on hindcrown; throat grey; breast grey-green, without male's black breast band; lacks blue-black spots on scapulars and wing-coverts. Juvenile like adult female, but lacking blue-black

patch on hindcrown; feathers of upperparts have yellow fringes, forming a scaly pattern; most or all young males have tinge of purple on lower forehead from an early age. Race *temminckii* has breast tinged with purple, female with larger dark patch over much of crown.

Habitat. Occurs in a variety of forested habitats, including mangroves, agroforest with scattered trees, secondary forest and primary forest; at Ujung Pandang in SW Sulawesi, occurs in urban areas; elsewhere in Sulawesi found only in hill forest at 500-1500 m. In New Guinea found from sea-level to mountain forests, locally reaching altitudes of c. 1600 m.

Food and Feeding. Frugivorous; takes a variety of small to medium-sized fruits; in a study in Papua New Guinea, four families (Moraceae, Lauraceae, Arecaceae, Burseraceae) contributed 82% of the diet by volume; in N Queensland, 88% of total foraging activity was in members of the families Lauraceae and Araliaceae. Most often feeds in the canopy and outer foliage; also feeds in low trees in understorey and at forest edge. Usually seen singly, in pairs, or in small groups; sometimes forms large aggregations at abundant food sources.

Breeding. In Papua New Guinea, nests found during both rainy and dry seasons, and nesting probably occurs all year round; in N Queensland, season extends Jun-Feb, with peak Nov-Dec. Nest is a slight platform of twigs placed amid foliage, 1.5-10 m up (mean 2-2 m); placed in variety of habitats, including garden areas, littoral forest, forest edge and open forest. Lays 1 white egg; incubation 14 days, by both sexes, female at night, male by day; chick covered in sparse yellowish down, but feathers develop rapidly; by 6th day, plumes of body tracts, tail-coverts and rectrices break from quills and chick will leap from nest and flap rapidly along ground if disturbed; nestling was attended by the adults on the same schedule as during incubation; nestling period estimated in Queensland at 7 days, a remarkably short period which, however, has received support from limited aviary observations. Nest success in Queensland was only 25 % at 18 nests; in all cases failure appeared due to predation by birds and snakes.

Movements. Some populations presumably sedentary, others highly mobile; movement patterns poorly understood. In times of food shortage, appears to be strongly nomadic, with vagrants dispersed over a wide area; nocturnal flights across Torres Strait are known from Sept-Apr. Flight swift, with loud whistle of wings.

Status and Conservation. Not globally threatened. Common throughout much of its extensive range; shy and inconspicuous, and probably under-recorded. In Sulawesi and Moluccas, species described as moderately common. Considered endangered in New South Wales, at the southern edge of its range, with population there estimated to be under 500 birds (possibly even under 100 birds), most of which are vagrants.

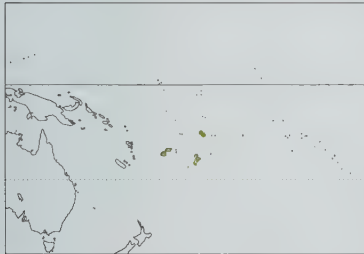
Bibliography. Allan (1984), Baptista (1990), Beehler *et al.* (1986), Blakers *et al.* (1984), Blaszkiewicz (1994b), Cain (1954a), Cain & Galbraith (1956), Coates (1985), Coates & Bishop (1997), Crawford (1981), Crome (1975a, 1975b), Date *et al.* (1991), Diamond (1972a, 1975c), Dickinson *et al.* (1991), Frith, H.J. (1977, 1982), Frith, H.J., Crome & Wolfe (1976), Gilliard & LeCroy (1961), Hadden (1981), Higgins & Davies (1996), Innis (1989), Mayr & Gilliard (1954), Mayr & Rand (1937), Morris (1993), Rand (1942a), Rand & Gilliard (1967), Rutgers & Norris (1970), Safford & Atwood (1996), Stresemann (1941), White & Bruce (1986), Whitten *et al.* (1987).

232. Many-coloured Fruit-dove

Ptilinopus perousii

French: Ptilope de La Pérouse **German:** Perousefruchttaube **Spanish:** Tilopo Multicolor
Other common names: Rainbow/Nutmeg/Painted Dove

Taxonomy. *Ptilinopus perousii* Peale, 1848, Upolu, Samoa. A distinctive species, notable for its striking sexual dichromatism; considered by some authorities to form a subgroup with *P. superbus* within the large *P. purpuratus* species-group; alternative opinion allies present species with *P. purpuratus* group, but does not consider it closely related to *P. superbus*. Two subspecies recognized.
Subspecies and Distribution.
P. p. perousii Peale, 1848 - Samoa.
P. p. mariae Jacquinot & Pucheran, 1853 - Fiji and Tonga.



Descriptive notes. 22-23 cm; 85-93 g. Pale yellowish white above, with crimson band across upper back; forehead and crown crimson; prominent breast patch with purplish pink spots; undertail-coverts crimson. Female very different, and more typical of members of *P. purpuratus* species-group; head and neck grey-green, with crimson cap; wings dark green; breast patch with green speckling above a faint pinkish band; undertail-coverts crimson. Juvenile similar to female, but with yellow fringes to most contour feathers and yellowish belly; youngest juveniles lack the colourful cap, which appears before young males moult into adult male plumage. Race *mariae* differs in being rather whiter; female has yellow undertail-coverts.

Habitat. A bird of the forest canopy, feeding and perching in the crowns of tall trees; usually found in mature forest, but may enter villages to feed in fruiting banyans; in Fiji, occurs on some small islands with only scrub forest habitat. Mostly in lowlands, but up to 700 m.

Food and Feeding. Completely frugivorous; in Tutuila, American Samoa, feeds almost exclusively on two species of banyans, *Ficus prolixa* and *F. obliqua* (Moraceae); also takes *Cananga* (Annonaceae), *Bischofia* (Euphorbiaceae), *Dysoxylum* (Meliaceae) and *Santalum* (Santalaceae). Often gathers in small flocks to feed in the crowns of large banyans; an active species when feeding, hopping vigorously through the canopy; aggressive interactions are frequent in these flocks, especially between males.

Breeding. Limited data suggest nesting may occur all year round. Nest is a fragile platform of twigs, often fairly high above the ground and placed in small terminal branches or on the fork of a branch. Lays 1-2 pure white eggs; both sexes incubate and brood in turn.

Movements. Probably travels widely in search of favoured food; in American Samoa, birds appeared in large banyans as soon as the fruit was ripe, only to disappear from the area again when the crop was exhausted. Flight swift and direct, usually well above the canopy.

Status and Conservation. Not globally threatened. Generally uncommon and local even in undisturbed areas, although its apparently nomadic habits make assessment of numbers difficult. Rare and local in Samoa, where it may be threatened by the loss of banyan trees following severe cyclones in 1990 and 1991, as well as by clearing of native forests. The species' tendency to congregate in fruiting banyans increases its vulnerability to hunting.

Bibliography. Amerson *et al.* (1982), Armstrong (1932), Banks (1984), Beichle (1989, 1991b), Beichle & Maelzer (1985), Blockstein (1988a), Cain (1954a, 1954b), Clapp & Sibley (1966), Clunie (1984), Engbring & Ramsey (1989), Holyoak (1979), Holyoak & Thibault (1978), Mayr (1945b), Murphy (1924a), Muse & Muse (1982), Pratt

et al. (1987), Reed (1980b), Rinke (1987), Ripley & Birkhead (1942), Rutgers & Norris (1970), Watling (1982a), Whitmee (1875), Yaldwyn (1952).

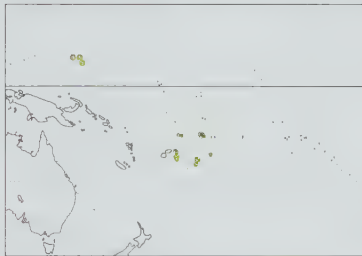
233. Purple-capped Fruit-dove

Ptilinopus porphyraeus

French: Ptilope de Clémentine **Spanish:** Tilopo Coronipúrpura
German: Purpurscheitel-Fruchttaube
Other common names: Crimson-crowned/Purple-crowned/Purple-capped Fruit-dove, Pohnpei/Ponape Dove

Taxonomy. *Columba porphyraea* Temminck, 1821, Tongatabu. Sometimes considered conspecific with *P. pelewensis*; within the large *P. purpuratus* species-group, these two have been considered to form a subgroup with *P. richardsii* and *P. greyii*. Race *ponapensis* formerly considered a distinct species, incorporating *hensheimi*. Proposed race *graeffei* of Wallis and Futuna, and Niuao'ou (Tonga) is probably a hybrid population between nominate and race *fasciatus*; *marshallianus* included in *hensheimi*. Four subspecies recognized.

Subspecies and Distribution.
P. p. ponapensis Finsch, 1878 - Chuuk and Pohnpei (C & E Caroline Is).
P. p. hensheimi Finsch, 1880 - Kosrae (E Caroline Is); formerly also on Ebon (Marshall Is).
P. p. porphyraeus (Temminck, 1821) - small islands of Fiji (Vatulele, Makogai, Wakaya, Yadua, Lau group), Tonga and Niue.
P. p. fasciatus Peale, 1848 - Samoa.
Also Wallis and Futuna, and Niuao'ou (Tonga), where populations probably hybrid.



Descriptive notes. 22-24 cm; 90-124 g. Upperparts, wings and tail are dark green; head, neck and breast are light greenish grey, with a darker green patch of streaking on lower breast; forehead and crown are bright purple, with a faint yellow border; belly colour ranges from yellow to orange to dark purple; rectrices tipped with yellowish to grey band. Sexes alike. Juvenile has small, indistinct crown patch, and more uniformly bright green body plumage, with yellow feather edgings. Races differ in coloration, particularly of crown and underparts, and slightly in size.

Habitat. An adaptable species, found in primary rainforest, mangroves, atoll strand, scrub and agroforest. Appears to adapt well to secondary forest, and will even feed in villages if undisturbed, but on some islands more restricted to dense forest in mountains.

Food and Feeding. Completely frugivorous; with the exception of banyans (*Ficus*, Moraceae), most favoured food plants are edge or understorey trees or shrubs, including *Cordyline* (Agavaceae), *Rhus* (Anacardiaceae), *Cananga* (Annonaceae), *Bischofia* (Euphorbiaceae), *Micromelum* (Rutaceae) and *Pipturus* (Urticaceae). Usually feeds alone or in pairs, though loose temporary aggregations may form at large fruit crops in banyans; feeds in the crowns of large trees, but also often found beneath the canopy, or in small trees or shrubs.

Breeding. Probably breeds all year round; on Chuuk, nests with eggs were found in Feb, Apr, Jun-Aug and Dec; in 'Eua (Tonga), juveniles seen in Jan-Mar, Jul, Aug and Oct; in Tutuila (American Samoa), juveniles seen in Jan, Feb, Apr-July, Sept and Dec. Nest is a fragile platform of twigs and sticks; usually located in small trees or the understorey, 3-10 m up. Lays 1 white egg.

Movements. Probably sedentary; rarely seen making long-distance flights. Flight swift and direct; may fly either above the canopy or below it.

Status and Conservation. Not globally threatened. Common to abundant throughout its range. The ability of this species to adapt to a variety of disturbed forest types, and its broad diet, suggest that habitat conversion will effect it less severely than many other native forest birds of the tropical Pacific. Hunted in some areas, but this does not appear to threaten any population currently. Extinct on Ebon, Marshall Is.
Bibliography. Amerson *et al.* (1982), Armstrong (1932), Baker (1951), Banks (1984), Beichle (1989, 1991b), Beichle & Maelzer (1985), Blockstein (1988a), Brandt (1962), Cain (1954a, 1954b), Clapp & Sibley (1966), Clunie (1984), Engbring & Ramsey (1989), Engbring *et al.* (1990), Gill (1995), Holyoak & Thibault (1978), Mayr (1945b), Murphy (1924a), Muse & Muse (1982), Pratt *et al.* (1987), Reed (1980b), Rinke (1986a, 1987), Ripley & Birkhead (1942), Rutgers & Norris (1970), Watling (1982a), Whitmee (1875), Yaldwyn (1952).

234. Palau Fruit-dove

Ptilinopus pelewensis

French: Ptilope des Palau **German:** Palaufuchttaube **Spanish:** Tilopo de las Palau

Taxonomy. *Ptilinopus pelewensis* Hartlaub & Finsch, 1868, Palau Islands. Sometimes considered conspecific with *P. porphyraeus*; within the large *P. purpuratus* species-group, these two have been considered to form a subgroup with *P. richardsii* and *P. greyii*. Monotypic.
Distribution. Palau Is, from Babelthup to Angaur.



Descriptive notes. 23-25 cm; 93 g. Differs from *P. porphyraeus* most notably in colour of undertail-coverts. Dark purple cap with a yellow posterior border; rest of head, nape and breast grey; rather faint reddish purple patch of streaking in centre of breast formed by bases of bifurcated feathers; orange band across belly shading to yellow on vent; undertail-coverts maroon to purple; back, wings and tail dark olive-green; yellow terminal tail band; bill dark grey, tip greenish; legs dark red. Sexes alike. Juvenile lacks purple cap; upperparts green with yellow feather edging, underparts yellowish.

Habitat. Occurs in a variety of forest habitats.
Food and Feeding. Frugivorous; gizzard of a collected bird contained the unbroken fruits of *Pinanga insignis*. Feeds primarily in the canopy, but sometimes in shrubs and ground plants.
Breeding. Nesting recorded in Sept; a frail platform of twigs, placed in tree or shrub. Clutch 1 white egg.
Movements. No information.

Status and Conservation. Not globally threatened. One of the most abundant birds on all the major islands of Palau; its numbers were estimated at over 45,000 birds in 1991. It is protected by law, but occasionally taken by hunters in search of *Ducula oceanica*.

Bibliography. Baker (1951), Dahl (1986), Engbrings (1992), Marshall (1949), Pérez & Kami (1967), Pratt, Bruner & Berrett (1987), Pratt, Engbring *et al.* (1980), Ripley & Birkhead (1942).

235. Rarotonga Fruit-dove

Ptilinopus rarotongensis

French: Ptilope de Rarotonga **German:** Rarotongafruchttaube **Spanish:** Tilopo de Rarotonga
Other common names: Cook (Island) Fruit-dove

Taxonomy. *Ptilinopus rarotongensis* Hartlaub and Finsch, 1871, Rarotonga, Cook Islands.

A member of the large *P. purpuratus* species-group; intermediate in appearance between the species in the proposed *P. porphyraceus* and *P. purpuratus* subgroups. Two subspecies recognized.

Subspecies and Distribution.

P. r. rarotongensis Hartlaub & Finsch, 1871 - Rarotonga (Cook Is.).

P. r. goodwini Holyoak, 1974 - Atiu (Cook Is.).



Descriptive notes. 20-24 cm. Crown bright magenta; rest of head, neck and breast pale grey with less green than in the similar *P. porphyraceus*; back, wings and tail green with broad silvery terminal band; belly patch olive-yellow with pinkish purple central area shading to creamy yellow on ventral areas and undertail-coverts. Sexes alike. Juvenile crown and belly patches reduced or lacking, underparts and tail band greener. Race *goodwini* differs in having only a few orange-tipped feathers instead of purplish area in centre of belly patch.

Habitat. On Rarotonga found only in dense low hillside forest, mostly in the interior of the island; on Atiu occurs in a wider variety of wooded habitats including the fringes of plantations, as well as the interior makatea (reef limestone) regions; generally avoids heavily settled areas. Found at all altitudes on the islands.

Food and Feeding. Primarily frugivorous; known food plants include banyans (*Ficus*, Moraceae), *Elaeocarpus* (Elaeocarpaceae) and *Pipturus* (Urticaceae); also reported to peck small insects from foliage. Typically feeds in trees and bushes.

Breeding. Specimens in breeding condition collected in Jul and Sept.

Movements. No evidence of inter-island movements. Flight is direct, with quick wingbeats; has been seen to soar and glide clumsily in strong winds.

Status and Conservation. Not globally threatened. Currently considered near-threatened. Remains common in rugged makatea limestone forests on Atiu, but this habitat totals less than 1000 ha. Nominally race of Rarotonga is endangered, and may number fewer than 100 individuals. Species requires attention: research and surveys needed in order to verify immediate conservation requirements; tiny extent of range in which species known to have healthy populations indicates that species can hardly be considered secure, as this population could be wiped out overnight by disease, disaster, introduced predators, etc.

Bibliography. Cain (1954a, 1957), Dahl (1986), Franklin & Steadman (1991), Gill (1996), Holyoak (1974c, 1980), Holyoak & Thibault (1984), McCormack (1997), Pratt *et al.* (1987), Ripley & Birkhead (1942), Steadman (1991).

236. Mariana Fruit-dove

Ptilinopus roseicapilla

French: Ptilope des Mariannes **German:** Rosenkopf-Fruchttaube **Spanish:** Tilopo de las Marianas
Other common names: Rose-capped Fruit-dove

Taxonomy. *Columba roseicapilla* Lesson, 1831, Marianas Islands.

A member of the *P. purpuratus* species-group, though its position within this large assemblage is unclear; very similar to *P. regina*. Monotypic.

Distribution. Saipan, Tinian, Agiguan, Rota and Guam (Marianas Is.).



Descriptive notes. 22-24 cm; 92 g. Forehead, crown and malar patch deep rose-red; cap bordered with greenish yellow; remainder of head, neck, upper back and breast dark silvery grey; rest of upperparts bright green; small purple patch on lower breast running into a larger orange patch and shading to yellow on ventral regions; undertail-coverts pinkish or yellowish orange; tail with broad greyish white terminal band; iris yellow; bill dark green; legs dark red. Sexes alike. Juvenile green with yellow feather edges; lacks colourful cap.

Habitat. Found in various types of forested habitat; appears to prefer mature native forest; but also occurs in heavily grazed forest on Agiguan, openings in scrubland of introduced *Leucaena* trees on Tinian, secondary growth, and formerly mangroves on Guam.

Food and Feeding. Frugivorous; recorded food plants include *Triphasia*, *Guetarda*, *Scaevola*, *Ficus*, *Cestrum* and the introduced *Muntingia*; also observed to feed on leaves of *Cestrum* and flowers of *Passiflora*. Typically feeds in the canopy, but may descend to feed in bushes, or even on the ground, where takes fruits of introduced prostrate vine *Momordica charantia*.

Breeding. Nesting probably all year round on Guam, with confirmed records for all months except Dec and Feb. Nest is a crude, flat platform c. 13 cm wide and 1.5 cm deep, composed of 40-50 small, bare twigs; placed in fork of tree branch 1-7 m (mean 2.8 m) above the ground. Lays 1 white egg.

Movements. No information on movements. Flight swift and direct, usually covering short distances of 20-30 m, at canopy height.

Status and Conservation. Not globally threatened. Currently considered near-threatened. Potentially vulnerable; last known population on Guam is restricted to the fragments of forest on the

northern end of the island; indeed, this population may now be extinct. Species remains common in Northern Marianas (Rota, Tinian, Agiguan, Saipan), with highest densities on Rota; however, these populations are vulnerable to the accidental introduction of the brown tree snake (*Boiga irregularis*), which has exterminated almost all native birds from Guam; other threats include the spread of alien plants, especially *Leucaena*, habitat destruction, and hunting.

Bibliography. Anon. (1966, 1968), Baker (1947, 1951), Cain (1954a, 1957), Claridge (1987), Collar & Andrew (1988), Dahl (1986), Engbring *et al.* (1986), Hay (1986), Jenkins (1983), Jenkins & Aguan (1981), King (1978/79), Marshall (1949), Mayr (1945b), McGowan *et al.* (1964), Pratt *et al.* (1979, 1987), Ripley & Birkhead (1942), Seale (1901), Stophlet (1946).

237. Rose-crowned Fruit-dove

Ptilinopus regina

French: Ptilope à diadème **German:** Königsfruchttaube **Spanish:** Tilopo Reina
Other common names: Pink-capped/Pink-crowned/Grey-capped/Blue-spotted/Swainson's Fruit-dove, Red-crowned/Pink-crowned Pigeon

Taxonomy. *Ptilinopus purpuratus* var. *Regina* Swainson, 1825, New South Wales.

Considered to belong to the large *P. purpuratus* species-group, though its position within this large assemblage is unclear; very similar to *P. roseicapilla*. Precise limits of some races uncertain, and whole of internal taxonomy may require reappraisal. Five subspecies currently recognized.

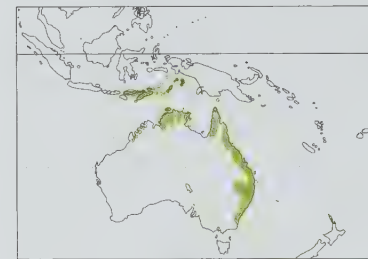
Subspecies and Distribution.

P. r. flavicollis Bonaparte, 1855 - Flores, Roti, Sawu, Semau and Timor (possibly only in the W of the island).

P. r. roseipileum Hartert, 1904 - E Timor, Wetar, Romang, Kisar, Moa and Leti.

P. r. xanthogaster (Wagler, 1827) - Banda, Kai Is, Damar, Sermata, Babar, Teun, Nila, Tanimbar Is and Aru Is.

P. r. ewingii Gould, 1842 - N Australia, from Kimberley region to N Northern Territory and Melville I.
P. r. regina Swainson, 1825 - islands in Torres Strait and E Australia, from Cape York to S New South Wales.



Descriptive notes. 22-24 cm; 85-125 g. Forehead and forehead deep pink to mauve-red, narrowly bordered yellow; chin and throat cream to yellow; rest of head and neck greenish grey, grading to green on lower neck and upperparts; wings green with paler fringes and dark centres to primary-coverts; inner tertials with large dark blue spot near tips; breast pale greyish green, mottled with green and with bifurcated feathers giving spiky appearance; large patch of streaking at centre of lower breast mauve-pink to purple; rest of lower breast orange, grading to yellow on lower belly and undertail-coverts; tail green above, grey

below, with broad yellow band at tip; bill and legs greyish green. Female similar to male, but duller, with smaller and duller breast patch. Juvenile lacks pink cap; head and neck green with dull white throat; feathers of upperparts with yellow fringes; terminal tail band grey rather than yellow. Races differ mainly in colour of cap and breast spot: *xanthogaster* and *roseipileum* are palest, with cap and breast spot silvery grey to pale pinkish silver.

Habitat. Inhabits a variety of forest types, including rain forest, gallery forest, monsoon forest and mangroves. In Australia, occupies tropical and subtropical rain forest at different times of year. Will opportunistically visit small patches of forest and thickets.

Food and Feeding. Frugivorous; takes a wide variety of fruits; Laurels (Lauraceae) are important components of diet in those forests in which they are abundant; other plant families that are regularly used include Araliaceae, Boraginaceae, Moraceae, Arecaceae and Piperaceae. Feeds actively, clambering over the foliage like parrot, often hanging upside-down to reach fruit; almost all foraging is in large trees, primarily in the canopy; usually seen in pairs or small groups of 5-6 birds.

Breeding. At Richmond R, New South Wales, season mid-Oct to Feb, the period of greatest local fruit abundance. Nest a slight platform of twigs, usually in low growth or vines up to 6 m, though nests as high as 30 m have been reported; sometimes in mangroves over water. Lays 1 white egg; incubation 16-18 days; five aviary chicks averaged 6.7 g at hatching, and were sparsely covered with white down; growth rapid, with one aviary-reared chick increasing 500% in weight in 8 days; nestling period in the wild appears to be remarkably short, c. 7-8 days, whereas in captivity nestling period 11-14 days; body moult of two chicks was completed at 100 and 120 days.

Movements. Appears to be semi-migratory in Australia; regularly present in N Queensland Jun-Sept (extremes Mar-Nov), and in S Queensland Nov-Apr (extremes Oct-Jun); however, species is very inconspicuous when not breeding, and this may exaggerate impression of seasonal absence. Flight rapid, with whistling wings.

Status and Conservation. Not globally threatened. Remains common in many areas; some populations are threatened by habitat loss and fragmentation. Locally common in Wallacea, where generally commonest on small or very small islands. Population in New South Wales estimated at 1600-2000 birds; considered rare and vulnerable.

Bibliography. Beehler *et al.* (1986), Blakers *et al.* (1984), Cain (1954a), Coates (1985), Coates & Bishop (1997), Collins & Jessop (1996), Crome (1975a), Date, Ford & Recher (1991), Date, Recher & Ford (1992), Diamond (1972a), Frith (1982), Gibbs (1990), Higgins & Davies (1996), Innis (1989), Johnstone (1981), Ripley & Birkhead (1942), Rutgers & Norris (1970), White & Bruce (1986).

238. Silver-capped Fruit-dove

Ptilinopus richardsii

French: Ptilope de Richards **German:** Silberkappen-Fruchttaube **Spanish:** Tilopo de Richards
Other common names: Richard's/Pink-spotted(?) Fruit-dove

Taxonomy. *Ptilopus richardsii* E. P. Ramsay, 1882, Uki, Solomon Is.

Placed within the large *P. purpuratus* species-group; often considered particularly close to *P. greyii*; has also been linked with *P. porphyraceus* and *P. pelawensis*. Two subspecies recognized.

Subspecies and Distribution.

P. r. richardsii (Ramsay, 1882) - Uki and Santa Ana (E Solomon Is.).

P. r. cyanopterus Mayr, 1931 - Rennell and Bellona (SE Solomon Is.).

Descriptive notes. 20-22 cm; 99 g. Forehead, crown and malar area silvery grey to pale bluish grey, bordered by an inconspicuous yellow-green line; throat pale yellow; rest of head, neck, breast



greenish yellow terminal bar; bill dark green at base, pale yellowish green at tip; legs bluish to reddish purple. Sexes alike. Juvenile mainly green with grey tinge on forehead; belly patch and

and upper mantle silver-grey, strongly washed with yellow; central breast feathers bifurcated, with pale shining silvery green tips and yellow-green bases; large belly patch bright orange; flanks yellowish green; tibial and ventral feathers yellowish green tipped with orange; undertail-coverts bright orange, often tinged or intermixed with pink; back, rump, uppertail-coverts and inner wing-coverts moss green; outer part of wing shining bluish green with bronze-yellow fringes to secondaries; bright pale pink areas on scapulars and innermost secondaries form bright spots and streaks on inner edge of wing; tail dark green with pale

undertail-coverts yellow; yellow fringes to feathers except on head and neck. Race *cyanopterus* has darker cap, yellow throat, smaller orange belly patch and red base to bill.

Habitat. Found in lowland forest including hurricane-damaged forest; on Uki visits isolated trees away from main forested areas.

Food and Feeding. Frugivorous; feeds on small fruits and berries. Large numbers may gather in fruiting trees.

Breeding. Season not recorded but courtship displays observed in Mar. Nest is a slight platform, typical of genus, c. 6 m above the ground. Lays 1 white egg.

Movements. Reports of species occurring on San Cristobal indicate that it is capable of inter-island flights. Flight rapid and direct with head held low.

Status and Conservation. Not globally threatened. Very little recent information available; reported to be abundant on Uki in 1950's; apparently still common on Rennell. May be vulnerable because of restricted island range, much of it within the hurricane belt. Surveys needed in order to establish current status and trends, as well as any conservation requirements.

Bibliography. Bradley & Wolff (1956), Cain (1954a), Cain & Galbraith (1956), Dahl (1986), Mayr (1945b), Ripley & Birkhead (1942).



239. Grey-green Fruit-dove

Ptilinopus purpuratus

French: Ptilope de la Société **German:** Tahitifruchttaube **Spanish:** Tilopo de las Sociedad
Other common names: Society Island/Tahiti/Purple-capped(!) Fruit-dove

Taxonomy. *Columba purpurata* J. F. Gmelin, 1789, Tahiti, Society Islands. Member of a large species-group distributed from Australia to Micronesia and Polynesia; often considered to form a subgroup with *P. perousii*, *P. chalcurus*, *P. coralensis*, *P. huttoni*, *P. dupetithouarsii*, *P. mercierii* and *P. insularis*; other members of the species-group are *P. porphyraeus*, *P. pelawensis*, *P. richardsii*, *P. greyii*, *P. rarotongensis*, *P. roseicapilla*, *P. regina* and perhaps *P. superbus*. Taxonomic limits of present species have been variously interpreted, some authors considering *P. coralensis* and *P. chalcurus*, and perhaps also *P. insularis*, to be races of present species, and others considering race *chrysogaster* and *P. chalcurus* to be races of *P. coralensis*. Race *chrysogaster* quite distinct and may merit full species status; race *frater* differs only rather slightly from nominate, and may be of questionable validity. Three subspecies recognized.

Subspecies and Distribution.

P. p. chrysogaster G. R. Gray, 1854 - Bora Bora, Raiatea, Tahaa, Huahine and Maupiti (W Society Is).
P. p. frater Ripley & Birkhead, 1942 - Moorea (E Society Is).
P. p. purpuratus (J. F. Gmelin, 1789) - Tahiti (E Society Is).



Descriptive notes. 20 cm; 95 g. Tends to show typical plump *Ptilinopus* body-shape in contrast to the more slender form of closely related *P. chalcurus* and *P. coralensis*. Forehead and crown purple to pale mauve with indistinct greenish yellow border posteriorly; head, neck and breast silvery grey, tinged with green on belly and flanks; belly and ventral areas pale yellow; upperparts olive-green; subterminal tail band narrow, grey; iris yellow or orange; bill greenish yellow or yellow with orange cere; legs purplish. Sexes alike, but female has more greenish tinge to grey of neck and breast. Juvenile lacks colourful crown; duller overall.

with yellow fringes to feathers of upperparts and wings. Race *frater* has cap and underparts slightly brighter; *chrysogaster* has cap distinctly paler with broader yellow border, belly bright yellow, terminal tail band broader, first primary with longer and more abruptly attenuated tip.

Habitat. Lowland forests, plantations and river valleys. Occurs at least as high as 1000 m on Tahiti.

Food and Feeding. Frugivorous; feeds on a variety of native and introduced plants, including chilis (*Capsicum*, Solanaceae), guava (*Psidium*, Myrtaceae), figs (*Ficus*, Moraceae) and *Cananga* (Annonaceae); also reported to eat the flowers of vanilla (*Vanilla*, Orchidaceae). Feeding is almost entirely arboreal, in contrast to the closely related *P. coralensis*.

Breeding. Breeds all year round. Nest is a slight platform of twigs; one nest was 12 m up in a dense cluster of twigs, just below the top of a broad-leaved tree. Lays 1 egg; in one case nestling had grey down adhering to its growing feathers; parents remained perched quietly in a nearby tree while the observer climbed to inspect the nest.

Movements. No information on movements or home range. Flight strong and direct with rapid, rather shallow wingbeats; often makes short gliding flights; sometimes circles high over trees.

Status and Conservation. Not globally threatened. Reported to be common, but shy where hunted; apparently much less common than formerly, possibly due to predation by the introduced Pacific Marsh-harrier (*Circus approximans*).

Bibliography. Bruner (1972), Cain (1954a, 1957), Dahl (1986), Holyoak (1973c), Holyoak & Thibault (1978, 1984), Murphy (1924a), Pratt *et al.* (1987), Ripley & Birkhead (1942), Seitre & Seitre (1991), Thibault (1973c, 1988), Thibault & Rives (1988), Wilson (1907).

240. Makatea Fruit-dove

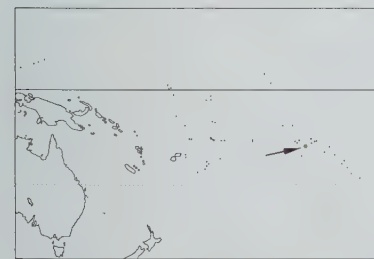
Ptilinopus chalcurus

French: Ptilope de Makatée **German:** Makateafruchttaube **Spanish:** Tilopo de la Makatea
Other common names: Mahatea Fruit-dove

Taxonomy. *Ptilinopus* [sic] *chalcurus* G. R. Gray, 1859, "Cook or Hervey Islands"; error = Makatea, Tuamotu.

A member of the large *P. purpuratus* species-group, within which associated with the *P. purpuratus* subgroup; often considered to be a race of *P. coralensis* or *P. purpuratus*. Monotypic.

Distribution. Makatea (Tuamotu Archipelago).



Descriptive notes. 20-23 cm. Like *P. coralensis*, has a relatively slender form for the genus. Lores, forehead and crown purple, with no trace of yellow posterior border seen in *P. coralensis*; remainder of head, neck and breast greenish grey, less grey than in *P. coralensis*; ventral area yellow; upperparts green; iris red; bill yellow; legs red. Sexes alike. Juvenile lacks purple crown but colourful crown feathers appear earlier in this species than in *P. coralensis*; iris and legs brown.

Habitat. Found throughout wooded areas of the uplifted coral island of Makatea; even occurs in villages.

Food and Feeding. Little information; reported to eat insects, seeds, and the fruits of *Cananga odorata* and *Ficus prolixa*.

Breeding. Birds have been found in breeding condition in Aug.

Movements. No information.

Status and Conservation. **VULNERABLE.** Reported to be common in areas of remaining forest; total population estimated at less than 1000 birds in 1993. Area of Makatea I is only 28 km², where over half of the forest cover has been destroyed by phosphate mining; species may increase in number as forested areas recover. Being endemic to a single small island, present species is particularly vulnerable to habitat destruction and introduced predators; populations require monitoring.

Bibliography. Bruner (1972), Cain (1957), Collar *et al.* (1994), Dahl (1986), Holyoak (1973c), Holyoak & Thibault (1984), Murphy (1924b), Pratt *et al.* (1987), Ripley & Birkhead (1942), Seitre & Seitre (1991), Thibault (1973c), Thibault & Guyot (1987).

241. Atoll Fruit-dove

Ptilinopus coralensis

French: Ptilope des Tuamotou **German:** Tuamotufruchttaube **Spanish:** Tilopo de Tuamotu
Other common names: Tuamotu Fruit-dove

Taxonomy. *Ptilinopus coralensis* Peale, 1848, Aratika, Tuamotu.

A member of the large *P. purpuratus* species-group, within which associated with the *P. purpuratus* subgroup; often considered conspecific with *P. chalcurus* and *P. purpuratus*. Taxonomy of *Ptilinopus* in SE Polynesia is confused; present species has often been considered a race of *P. purpuratus*, along with *P. chalcurus*; other arrangements have considered *P. chalcurus* and *P. purpuratus* *chrysogaster* to be races of the present species. Monotypic.

Distribution. Tuamotu Archipelago (except Makatea).



Descriptive notes. 22-24 cm; 70-99 g. Tends to appear slender compared to its close allies. Pale olive green upperparts, with coppery highlights; forehead almost white at base of bill, lavender on crown, with a thin greyish yellow posterior border; head and breast grey, shading to grey-green on lower breast; ventral areas yellow; tail narrowly tipped silvery white; iris red; bill yellow; legs coral red. Sexes alike. Juvenile lacks lavender crown and grey neck, and has yellow fringes on feathers of crown, back, lesser wing-coverts and breast.

Habitat. The only extant fruit-dove found exclusively on low coral atolls; archaeological

evidence indicates that other Pacific atolls were once commonly inhabited by *Ptilinopus* and *Ducula* species, but few of these populations survive. Found in woodland, scrub and old, overgrown coconut plantations.

Food and Feeding. A mixed diet of insects, seeds and fruit, very unusual for a member of this genus; one has even been observed capturing and feeding on a small lizard; the diet reflects the limited availability of fruit on its atoll habitat. Insects are pecked from foliage and the ground with a quick darting motion; much foraging is done on the ground.

Breeding. Juvenile specimens have been collected in Feb and May; juveniles moulting into adult plumage in Feb, Mar, May and Sept. Nest not definitely described; the only information is a report of an old nest, identified by a Rangiroa native as belonging to this species; it was a typical flimsy dove's nest, placed in scrub; the informant reported that the species laid 1 pale brown egg, but this requires confirmation, as subsequent observers have only seen white eggs.

Movements. Unknown; flight is weak, suggesting limited mobility within the archipelago.

Status and Conservation. Not globally threatened. Currently considered near-threatened. Wide-spread and reported to be common on uninhabited atolls but scarce on inhabited ones. Atolls are fragile environments, and the species is vulnerable to habitat destruction, especially for conversion to coconut plantations; introduced predators are also a threat, as species is tame on uninhabited islets, allowing close approach before flying a short distance.

Bibliography. Bruner (1972), Cain (1954a, 1957), Dahl (1986), Holyoak (1973c), Holyoak & Thibault (1984), Lacan & Mougín (1974), Murphy (1924a, 1924b), Pratt *et al.* (1987), Ripley & Birkhead (1942), Seitre & Seitre (1991), Steadman (1989a), Thibault (1973c).

242. Red-bellied Fruit-dove

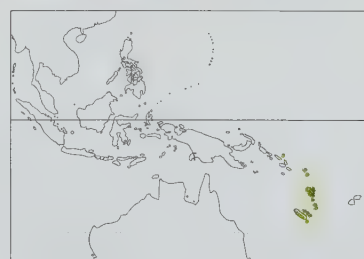
Ptilinopus greyii

French: Ptilope de Grey **German:** Greyfruchttaube **Spanish:** Tilopo de Grey
Other common names: Grey's Fruit-dove

Taxonomy. *Ptilinopus greyii* Bonaparte, 1857, Isle of Pines and Loyalty Islands.

Placed within the large *P. purpuratus* species-group; often considered particularly close to *P. richardsii*; has also been linked with *P. porphyraeus* and *P. pelawensis*. Monotypic.

Distribution. Ndai I (Gower) in CE Solomons S through Santa Cruz Is, Banks Group (Reef Is) and Vanuatu to Loyalty Is, New Caledonia and I of Pines.



Descriptive notes. 21-24 cm. Plumage generally grey-green; crown purplish red, fringed with yellow at sides and rear; mantle, wings and tail bright green; throat pale yellow; patch on belly purplish red; undertail-coverts pinkish orange; breast feathers bifurcated with silvery green tips and darker yellowish green bases; wing-coverts and secondaries fringed with yellow; primaries dark; tertials may have some large pinkish purple spots; terminal tail band greyish; undersides of wing and tail grey; bill olive green, legs dark red. Sexes alike, but red on breast of female less extensive. Juvenile all dull green with pale yellow edges to

feathers and with only a few or no red feathers in crown and belly.

On following pages: 243. Rapa Fruit-dove (*Ptilinopus huttoni*); 244. White-capped Fruit-dove (*Ptilinopus dupetithouarsii*); 245. Red-moustached Fruit-dove (*Ptilinopus mercierii*); 246. Henderson Fruit-dove (*Ptilinopus insularis*); 247. Coronated Fruit-dove (*Ptilinopus coronulatus*); 248. Beautiful Fruit-dove (*Ptilinopus pulchellus*); 249. Blue-capped Fruit-dove (*Ptilinopus monacha*); 250. White-bibbed Fruit-dove (*Ptilinopus rivoli*); 251. Yellow-bibbed Fruit-dove (*Ptilinopus solomonensis*).

Habitat. Mainly found in forest, in dense canopy; also in a wide variety of other wooded habitats including degraded forest, secondary growth, savanna woodland, and even agricultural areas, villages and suburban gardens.

Food and Feeding. Frugivorous; takes a variety of fruit, including figs (Moraceae), Meliaceae, the introduced *Muntingia* (Elaeocarpaceae), and the shrub *Solanum torvum* (Solanaceae). Feeds actively plucking fruit from the tips of branches, often hanging upside-down.

Breeding. Season Sept-Feb in Vanuatu; Aug recorded for Lifou (Loyalty Is). Nest is a slight platform of twigs, typical of the genus; most nests have been found at the forest edge, in secondary growth, or in savanna country; often only a few metres from the ground. Lays 1 white egg; incubation c. 18 days; both parents contribute to care of young.

Movements. Locally nomadic in response to alterations in food supply; probably also flies between islands. Flight is swift and direct with rapid wing-beats, usually close to the canopy over forest, or fairly low over the ground in open areas.

Status and Conservation. Not globally threatened. Apparently common throughout Vanuatu and Santa Cruz Is. Status in New Caledonia requires verification, as species may be merely a visitor. Can be hunted legally in Vanuatu, Apr-Jun.

Bibliography. Bregulla (1992), Cain (1954a), Hannecart & Létocart (1980), Layard & Layard (1878, 1880), Mayr (1945b), Ripley & Birkhead (1942).

243. Rapa Fruit-dove

Ptilinopus huttoni

French: Ptilope de Hutton

German: Rapafruchttaube

Spanish: Tilopo de Rapa

Other common names: Rapa Island/Hutton's/Long-billed Fruit-dove

Taxonomy. *Ptilinopus* [sic] *huttoni* Finsch, 1874. Rapa Island, Tubuai Islands.

A distinctive form that is thought to be a rather distant offshoot of the *P. purpuratus* species-group, perhaps closest to the *P. purpuratus* subgroup. Monotypic.

Distribution. Rapa I in Tubuai (Austral) Is.



Descriptive notes. 31 cm; 130 g. Forehead, forehead, small malar patch, patch on upper belly, and undertail-coverts pinkish purple; neck and breast silvery grey tinged with green; ventral area yellow; back, wings and tail dull green, shading to blue-green on wings; iris yellow; bill yellow, pink at base; legs red. Sexes alike. Juvenile lacks colourful crown; duller overall, with yellow fringes to feathers of wings and upperparts.

Habitat. Inhabits forest at 40–450 m elevation, preferring dense forest types; visits many kinds of tree, including many species introduced by man; there is even one report of nesting in a

monospecific plantation of introduced *Pinus caribaea*. Nevertheless, species is largely confined to the limited areas of natural habitat.

Food and Feeding. Primarily frugivorous, though also reported to feed on insects and on flowers or nectar of *Metrosideros* (Myrtaceae); long bill may facilitate feeding at flowers, but this requires verification. Fruits in the diet include guava, coffee beans, *Meryta* (Araliaceae) and *Homalanthus* (Euphorbiaceae).

Breeding. Juveniles collected in Feb, Apr and Dec.

Movements. Within the island, frequently flies between patches of the much fragmented habitat. Wingbeats heavy with intermittent glides.

Status and Conservation. VULNERABLE. Surveys in 1990 yielded a population estimate of 274 birds (175–368, with 95% confidence limits); this is in general agreement with surveys in 1974, suggesting that the population is not presently in sharp decline. Main threat is habitat loss, as forest is degraded and destroyed by goats, cattle, fire and felling; remaining potential habitat covers only 292 ha which is less than 8% of the island's area; only small patches of native forest remain in gullies, where the bird occurs at high densities. Conservation recommendations have been made, including fencing off the largest part of the Hiti Valley forest to exclude cattle and goats.

Bibliography. Bruner (1972), Cain (1954a), Collar & Andrew (1988), Collar *et al.* (1994), Dahl (1986), Hay (1986), Holyoak & Thibault (1978, 1984), King (1978/79), Pratt *et al.* (1987), Ripley & Birkhead (1942), Seitre, J. & Seitre (1991), Seitre, R. & Seitre (1992), Thibault (1988), Thibault & Varney (1991).

244. White-capped Fruit-dove

Ptilinopus dupetithouarsii

French: Ptilope de Petit Thouars

German: Weißkappen-Fruchttaube

Spanish: Tilopo Coroniblanco

Other common names: Marquesas/(Northern) Marquesan Fruit-dove

Taxonomy. *Columba Du Petithouarsii* Neboux, 1840, Tuhuata, Marquesas Islands.

A member of the large *P. purpuratus* species-group, most closely related to *P. mercierii*; usually associated with the *P. purpuratus* subgroup. Two subspecies recognized.

Subspecies and Distribution.

P. d. viridior (Murphy, 1924) - Nukuhiva, Uahuka and Upou (N Marquesas Is).

P. d. dupetithouarsii (Neboux, 1840) - Hivaoa, Tahuata, Mohotani and Fatuhiva (S Marquesas Is).



Descriptive notes. 20 cm; 90–110 g. Mantle, back, rump and wing-coverts yellowish olive-green; forehead and crown patch white, bordered by a narrow orange and yellow line; a short greyish white malar patch; nape and neck silvery grey; breast patch silvery, feathers bifurcated, with yellowish green bases; belly patch orange; undertail-coverts bright yellow; tail dark green with broad yellowish white terminal band; bill greenish; legs red to pinkish purple. Female similar but duller. Juvenile duller and greener with an obscure grey, green edged, cap and yellow fringes to most contour feathers. Race *viridior* differs in having grey areas more suffused with greenish yellow, and green parts more tinged with yellow, and cap cream-coloured.

Habitat. An adaptable species, occurring in all types of forest, including agroforest, at all elevations. Found primarily in the canopy, but will enter small trees and bushes to feed.

Food and Feeding. Frugivorous; figs of banyan trees are reported to be favoured; also known to feed on *Cananga* (Annonaceae), peppers (Piperaceae), guavas and coffee beans (Rubiaceae). It is reported that insects are fed to the young, but that the adults eat nothing but fruit.

Breeding. Recently fledged juveniles have been seen or collected in all months except Sept. Nest is a frail platform of twigs in trees and bushes 3–20 m above the ground. Lays 1 white egg.

Movements. No information on ranging behaviour but species often flies long distances over valleys on the larger islands. Flight rapid with hissing wing-beats.

Status and Conservation. Not globally threatened. Apparently remains common to abundant throughout Marquesas, except perhaps on Hivaoa, where the introduced Great Horned Owl (*Bubo virginianus*) has caused the decline of many native birds; accidental introduction of this or other predators to other islands might place species in jeopardy.

Bibliography. Cain (1954a, 1957), Collar & Andrew (1988), Dahl (1986), Ehrhardt (1978), Holyoak (1975), Holyoak & Thibault (1978, 1984), Murphy (1924a), Pratt *et al.* (1987), Ripley & Birkhead (1942), Seitre & Seitre (1991), Thibault (1973a, 1988).

245. Red-moustached Fruit-dove

Ptilinopus mercierii

French: Ptilope de Mercier

German: Rotbart-Fruchttaube

Spanish: Tilopo de Mercier

Other common names: Marquesas/(Southern) Marquesan/Red-capped Marquesas/Yellow-bellied Fruit-dove, Moustached Dove

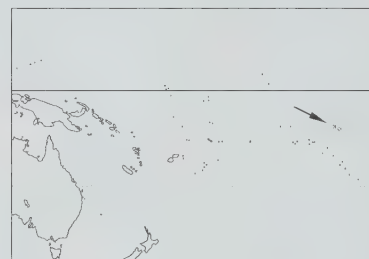
Taxonomy. *Kurukuru Mercierii* Des Murs and Prévost, 1849, Nukuhiva, Marquesas Islands.

A member of the large *P. purpuratus* species-group, most closely related to *P. dupetithouarsii*; usually associated with the *P. purpuratus* subgroup. Two subspecies recognized.

Subspecies and Distribution.

P. m. mercierii (Des Murs & Prévost, 1849) - Nukuhiva (N Marquesas Is).

P. m. tristrami (Salvadori, 1892) - Hivaoa (S Marquesas Is).



Descriptive notes. 21–23 cm. Plump and compact, with a short, nearly square tail. Cap and malar streak crimson red; head, neck and breast blue-grey; rest of underparts golden yellow; upperparts olive-green, tail tipped pale yellow. Female has grey parts more tinged with green. Juvenile lacks crimson on crown and malar streak, and has yellow edgings to feathers of upperparts. Race *tristrami* has less extensive red cap with yellow border behind; generally less greenish yellow.

Habitat. Little information. A bird of the forest canopy; apparently more montane than the commoner, sympatric *P. dupetithouarsii*; found

up to 1370 m.

Food and Feeding. Frugivorous; diet reported to be similar to that of *P. dupetithouarsii*, with which sometimes seen feeding together.

Breeding. Birds collected in breeding condition in Jan and Nov.

Movements. No information.

Status and Conservation. Almost certainly EXTINCT. Had apparently disappeared from Nukuhiva by 1922; searches on Hivaoa in 1970's and mid-1980's failed to find it; reports of this species on Hivaoa in 1980 were probably result of misidentification of *P. dupetithouarsii*. Causes of decline uncertain; on Hivaoa, the presence of the introduced Great Horned Owl (*Bubo virginianus*) may well have contributed to its demise.

Bibliography. Cain (1954a, 1957), Collar & Andrew (1988), Collar *et al.* (1994), Dahl (1986), Hay (1986), Holyoak (1975), Holyoak & Thibault (1978, 1984), Murphy (1924a), Pratt *et al.* (1987), Ripley & Birkhead (1942), Seitre, J. & Seitre (1991), Seitre, R. & Seitre (1992), Thibault (1988).

246. Henderson Fruit-dove

Ptilinopus insularis

French: Ptilope de Henderson

German: Silberwangen-Fruchttaube

Spanish: Tilopo de la Henderson

Other common names: Henderson (Islagd) Fruit-pigeon

Taxonomy. *Ptilopus insularis* North, 1908, Henderson Island, Pitcairn Group.

A member of the large *P. purpuratus* species-group, thought to be most closely related to *P. mercierii*; usually associated with the *P. purpuratus* subgroup; sometimes considered a race of *P. purpuratus*. Monotypic.

Distribution. Henderson I in Pitcairn Group; mostly confined to interior of island.



Descriptive notes. 20–25 cm; 95–105 g. Forehead and crown bright purplish crimson, narrowly bordered with yellow; throat white; nape, sides of head, neck and breast silvery grey tinged with green; belly patch yellowish green; ventral regions yellowish white; upperparts dark olive-green, narrowly edged yellow on wings; narrow greyish tail band, absent from central feathers; iris yellow to reddish orange; bill dark yellow to green; legs red to pinkish red. Female similar, but with greener tinge to grey areas. Juvenile lacks red crown, cap being bronzy green; wing and breast feathers have yellowish margins.

Habitat. Found in forests with dense understorey wherever this survives throughout the island.

Food and Feeding. Frugivorous; stomach contents of three specimens included fruit pulp and intact fruit of *Nesoluma* and *Isora*.

Breeding. During visits in Mar and Apr, both moulting adults and juveniles were collected; specimens collected in May had moderately enlarged gonads. No further information.

Movements. Rarely travels far; appears to be territorial, and reported to respond to playback of calls; often flies 100–200 m over the forest canopy.

Status and Conservation. VULNERABLE. Reported to be common and very tame; population estimated to number c. 3400 birds in 1990 and c. 4000 birds in 1992, using different techniques. Henderson is uninhabited, and the occasional wood-cutting visits by Pitcairn islanders do not appear to threaten the native birds; however, the island is vulnerable to the introduction of pest species, especially black rats (*Rattus rattus*), by unauthorized yacht landings.

Bibliography. Benton & Spencer (1995), Bourne & David (1983), Brooke & Jones (1995), Cain (1954a, 1957), Collar *et al.* (1994), Dahl (1986), Graves (1992), Holyoak & Thibault (1984), Ripley & Birkhead (1942), Williams (1960).

247. Coronated Fruit-dove

Ptilinopus coronulatus

French: Ptilope à couronne lilas

Spanish: Tilopo Coronita

German: Veilchenkappen-Fruchttaube

Other common names: Lilac-capped/Lilac-crowned/Coronated/Little Coronated/Diadem Fruit-dove; Lilac-crowned Fruit-pigeon

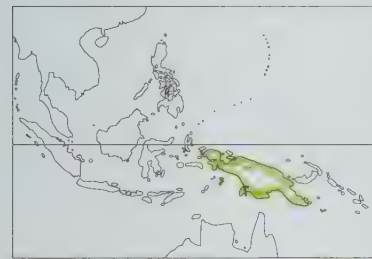
Taxonomy. *Ptilinopus* [sic] *coronulatus* G. R. Gray, 1858, Aru Islands.

Shows certain affinities with the large *P. purpuratus* species-group; considered to be most closely allied to *P. pulchellus*, and perhaps also closely related to *P. monacha*. Five subspecies recognized.

Subspecies and Distribution.

P. c. trigeminus Salvadori, 1875 - Salawati and W coast of Vogelkop (NW New Guinea).
P. c. geminus Salvadori, 1875 - Yapen I and N New Guinea from head of Geelvink Bay E to Takar.
P. c. quadriginus (A. B. Meyer, 1890) - N New Guinea between Humboldt Bay and Astrolabe Bay, including Manam I and Kairiru I.
P. c. huonensis (A. B. Meyer, 1892) - N coast of E New Guinea from Huon Bay to Goodenough Bay.
P. c. coronulatus G. R. Gray, 1858 - Aru Is and S coast of New Guinea from R Mimika to Milne Bay.

Descriptive notes. 18-21 cm; 69-75 g. Plumage green, tinged with golden yellow on breast and flanks; cap lilac, bordered with yellow; cheeks blue-green; throat yellow; lilac patch on lower breast, lower abdomen and undertail-coverts yellow to orange; scapulars and inner secondaries narrowly fringed with bright yellow; bill green; legs dark purplish red. Sexes similar but female often paler on yellow areas. Juvenile similar to adult but duller; one captive-bred juvenile showed lilac patches on crown at fledging, but lost these by a month old, presumably to abrasion. Races differ primarily in richness of crown colour and amount



of rusty orange on belly; *geminus* and *trigeminus* have palest crowns, and most rusty orange on belly.

Habitat. Inhabits rain forest, secondary forest and edge, monsoon forest and, in some areas, gallery forest. Generally a lowland species, but may be found as high as 1200 m in areas where *P. pulchellus* is absent; prefers drier locations than *P. pulchellus*.

Food and Feeding. Frugivorous; feeds on a variety of fruits, particularly figs (Moraceae), laurel (Lauraceae), and palms (Arecaceae). Feeds at all levels from understorey to upper canopy; appears to be less restricted to the canopy than *P. iozonus*, with which it often occurs. May be seen feeding singly, in pairs, or in small flocks; readily congregates in fruiting trees with other fruit-pigeons.

Breeding. Nests found in the Port Moresby area (Papua New Guinea) Sept-Apr, indicating that most breeding occurs from late dry season through to late wet season. Nest is a scanty platform of twigs placed on an accumulation of dead leaves; most nests are 1-2-3 m up (range 0.6-4.6 m), placed on a palm frond, the top of a low sapling or similar leafy setting; male collects twigs and brings them to female, which waits at nest-site. Lays 1 white egg; incubation 18 days, by male during day, and female at night; incubating bird sits very tightly, and keeps its brightly coloured crown facing away from any intruder; in captivity, fledging 12 days, though in the wild young capable of flying to escape danger at only 10 days; parents continue to look after fledgling for some time after it leaves nest. Level of nest predation very high: of 16 nests found by one observer only 2-3 were successful.

Movements. No information.

Status and Conservation. Not globally threatened. Few details available, but species reported to be common in many areas. Where *P. pulchellus* is frequent, present species is generally much less common. Extensive range, combined with reported abundance, suggests species relatively secure.

Bibliography. Andrew (1992), Bailey (1992a), Beehler (1978b), Beehler *et al.* (1986), Cain (1954a), Coates (1985), Diamond (1972a, 1975c), Frith, Braithwaite & Wolfe (1974), Frith, Crome & Wolfe (1976), Greig-Smith (1978), Hiaso *et al.* (1994), Mayr & Rand (1937), Mees (1982a), Ogilvie-Grant (1915), Rand (1942a), Rand & Gilliard (1967), Ripley (1964), Ripley & Birkhead (1942), Rutgers & Norris (1970), Stokes (1923), Tubb (1945).

248. Beautiful Fruit-dove

Ptilinopus pulchellus

French: Ptilope mignon

German: Rotkappen-Fruchttaube

Spanish: Tilopo Bonito

Other common names: Crimson-crowned/Crimson-capped/Grey-breasted Fruit-dove; Rose-fronted Pigeon

Taxonomy. *Columba pulchella* Temminck, 1835, Lobo Bay, New Guinea.

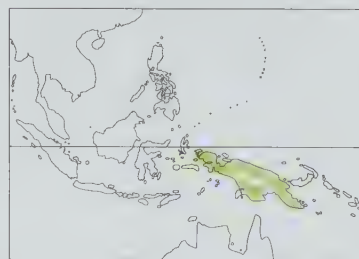
Has affinities with the large *P. purpuratus* species-group; considered to be most closely allied to *P. coronulatus*. Races hardly differ and doubtfully valid. Two subspecies recognized.

Subspecies and Distribution.

P. p. pulchellus (Temminck, 1835) - W Papuan Is and New Guinea (except NC).
P. p. decorus (Madarász, 1910) - N New Guinea from E shore of Geelvink Bay E to Astrolabe Bay.

Descriptive notes. 18-20 cm; 68-76 g. Forehead and crown purplish red; sides of head, foreneck and breast grey; throat and forepart of face white; many feathers of lower breast tipped with white, especially along lower edge of grey breast shield, where they usually form a whitish border; immediately below this is a broad band of dark reddish purple, with an orange patch below it; flanks green and yellow; belly yellow to orange; undertail-coverts orange; upperparts green; pale yellow fringes to secondaries and inner primaries; bill olive-green; legs purplish. Sexes similar but female with less extensive purple and orange on belly. Juvenile lacks crimson cap and has only a suggestion of purple and orange on belly. Race *decorus* said to have proportionately longer tail and more prominent white tips to breast feathers.

Habitat. Primary and secondary forest, mainly at medium altitude up to 750 m, though locally in lowlands and as high as 1370 m; prefers high rainfall areas; in Papua New Guinea, distribution



Nest is a loose slight platform of twigs and a few leaves, placed on lateral branches near the top of a slender understorey tree, or on a palm frond or other low platform 2-3 m above the ground. Lays 1 white egg.

Movements. No information on local or regional movements. Flight swift and direct.

Status and Conservation. Not globally threatened. Few details available, but species reported to be common in many areas; said typically to be commoner than *P. coronulatus* in areas of co-occurrence. Extensive range, combined with apparent adaptability to man-altered habitats and reported abundance, suggests species relatively secure.

Bibliography. Andrew (1992), Bailey (1992a), Beehler *et al.* (1986), Cain (1954a), Coates (1985), Diamond (1972a, 1975c), Frith, Braithwaite & Wolfe (1974), Frith, Crome & Wolfe (1976), Gregory (1995a, 1995b), Hiaso *et al.* (1994), Hoogerwerf (1971), Mayr & Rand (1937), Ogilvie-Grant (1915), Rand (1942a), Rand & Gilliard (1967), Ripley (1964), Rutgers & Norris (1970), Safford & Atwood (1996), Wahlberg (1992).

249. Blue-capped Fruit-dove

Ptilinopus monacha

French: Ptilope moine

German: Blaukappen-Fruchttaube

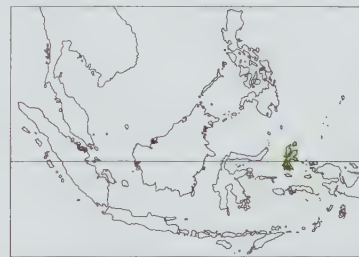
Spanish: Tilopo Monje

Other common names: Blue-crowned Fruit-dove

Taxonomy. *Columba monacha* Temminck, 1824, Sulawesi; error = Halmahera.

A distinct form of uncertain affinities, formerly considered to be very closely related to *P. coronulatus*, but now thought to be more distant; sometimes placed with *P. coronulatus* in the large *P. purpuratus* species-group. Monotypic.

Distribution. N Moluccas on Morotai, Halmahera, Ternate, Tidore, Moti, Kayoa, Kasiruta, Bacan, Damar and Obi.



Descriptive notes. 16-18 cm. Forehead and crown blue bordered by a bright yellow stripe running from in front of and over eye; malar patches and patch on breast also blue; throat stripe, ventral areas, and undertail-coverts pale yellow; rest of plumage rich green; outer tail feathers blackish green with paler terminal band; bill greenish; legs red. Female has only slight suggestion of blue head markings and lacks blue breast patch. Juvenile has yellow fringes to wing feathers more conspicuous.

Habitat. Inhabits lowland forest, forest edge and woodland, up to 750 m on Halmahera; also occurs in mangroves.

Food and Feeding. No information on diet; often gathers in small groups at fruiting trees.

Breeding. No information available.

Movements. No information available.

Status and Conservation. Not globally threatened. Currently considered near-threatened. Generally not very common but apparently difficult to observe, so may be more abundant than the few records suggest. Moderately common on Halmahera and Ternate.

Bibliography. Andrew (1992), Bishop (1992), Cain (1954a), Coates & Bishop (1997), Gibbs (1990), Lambert (1994b), Lambert & Young (1989), Ripley & Birkhead (1942), Sujatnika *et al.* (1995), White & Bruce (1986).

250. White-bibbed Fruit-dove

Ptilinopus rivoli

French: Ptilope de Rivoli

German: Korallenfruchttaube

Spanish: Tilope de Rivoli

Other common names: Beautiful(!)/Moon-breasted/White-breasted/High Mountain Fruit-dove

Taxonomy. *Columba Rivoli* Prévost, 1843, Duke of York Island.

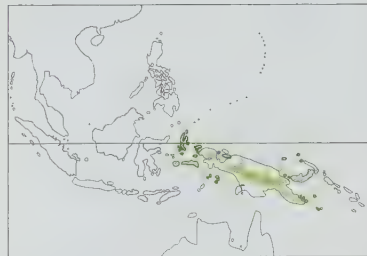
Considered to be closely related to *P. solomoniensis*, and allied to the *P. viridis* superspecies. Race *bellus* has sometimes been considered a separate species, as, less often, has *miquelii*. Five subspecies recognized.

Subspecies and Distribution.

P. r. prasinorrhous G. R. Gray, 1858 - Moluccas, Schildpad Is, Aru Is, W Papuan Is and some islands in Geelvink Bay.
P. r. bellus P. L. Sclater, 1874 - New Guinea, Karkar I and Goodenough I.
P. r. miquelii (Schlegel, 1873) - Meos Num I and Yapen I in Geelvink Bay.
P. r. rivoli (Prévost, 1843) - Bismarck Archipelago.
P. r. strophium Gould, 1850 - Egum Atoll in Trobriand Is and Louisiade Archipelago.

Descriptive notes. 22-26 cm; 135-162 g. Predominantly dark green with a slight golden tinge; forehead and forecrown purplish red; a large white or cream-coloured half-moon-shaped patch on breast; elongated oval purple patch in centre of belly; vent and undertail-coverts bright yellow; dark blue centres to scapulars forming spots; bill greenish yellow or yellow; legs reddish. Female green all over, except for yellow vent and undertail-coverts. Juvenile green all over, with yellow fringes to feathers of wings, breast and underparts; juvenile males may have traces of adult male's bright markings. Race *bellus* has frontal part of breast patch bright yellow, suggesting yellow half-moon bordered by white crescent; *strophium* lacks purple belly patch; *prasinorrhous* has green belly and undertail-coverts; *miquelii* has vent and undertail-coverts yellow.

Habitat. Inhabits primary rain forest, and sometimes secondary growth. Found in the mountains on large islands and near sea-level on small islands; on mainland New Guinea mainly at 1000-3260 m, but occasionally as low as 300 m.



to be fairly common to common, e.g. on higher reaches of Tari Gap (EC New Guinea), where frequently heard. In N Moluccas, status on Halmahera uncertain, as only known from three old specimens.

Bibliography. Andrew (1992), Beehler (1978b), Beehler *et al.* (1986), Bishop (1987), Bowler & Taylor (1989), Cain (1954a), Coates (1985), Coates & Bishop (1997), Diamond (1972a, 1975c), Diamond & Bishop (1994), Eastwood (1995c), Filewood (1974b), Gilliard & LeCroy (1961, 1967a), Gregory (1995a, 1995b), Hartert & Goodson (1918), Jepson (1993), Mayr & Rand (1937), Ogilvie-Grant (1915), Pratt (1982), Rand & Gilliard (1967), Ripley (1964), White & Bruce (1986).

251. Yellow-bibbed Fruit-dove

Ptilinopus solomonensis

French: Ptilope des Salomon **German:** Gelbbauch-Fruchttaube **Spanish:** Tilopo de las Salomón
Other common names: Yellow-breasted(!)/Splendid Fruit-dove

Taxonomy. *Ptilinopus* [sic] *solomonensis* G. R. Gray, 1870. San Cristobal, Solomon Islands. Considered most closely related to *P. rivoli*, and allied to the *P. viridis* superspecies. Nine subspecies recognized.

Subspecies and Distribution.

P. s. speciosus (Schlegel, 1873) - Numfor, Biak and Traitor's I in Geelvink Bay (NW New Guinea).
P. s. johannis (P. L. Slater, 1877) - Admiralty Is, St Matthias Group and New Hanover (Bismarck Archipelago).
P. s. meyeri Hartert, 1926 - New Britain and satellite islands (Crown, Long, Tolokiwa, Umboi, Malai, Sakar, Witu, Umboi, Watom).

Food and Feeding. Frugivorous; no detailed information on diet but species recorded taking fruits of wild limbum palms. Forages at all levels of the forest, singly or in pairs.

Breeding. Probably breeds all year round. Nest is a slight platform of twigs, placed 2-15 m up. Lays 1-2 eggs, unusual within genus in sometimes laying 2 eggs: a nest with 2 eggs, which the male was incubating, was found near Mt Hagen, Papua New Guinea, and similar cases have been reported elsewhere.

Movements. No information.

Status and Conservation. Not globally threatened. Very few data available; species reported

P. s. neumanni Hartert, 1926 - Nissan I in Green Is (W Solomons).

P. s. bistictus Mayr, 1931 - Bougainville and Buka (W Solomons).

P. s. vulcanorum Mayr, 1931 - Vella Lavella, Gatukai, Ranongga, Kolombangara, Rendova and Vangunu, in New Georgia Group (SW Solomons).

P. s. ocularis Mayr, 1931 - Guadalcanal (SE Solomons).

P. s. ambiguus Mayr, 1931 - Malaita (E Solomons).

P. s. solomonensis G. R. Gray, 1870 - San Cristobal and Uki (SE Solomons).



Descriptive notes. 19-22 cm; 91-100 g. General plumage green; forehead and front of crown mauve; a broad yellow crescent-shaped band across breast; vent and undertail-coverts yellow; large mauve-pink patch on lower breast and belly; dark blue spots on scapulars; bill greyish green; legs dark reddish purple. Female lacks colourful cap and breast patch; green with yellow on lower belly and undertail-coverts. Juvenile resembles adult female but with yellow fringes to most feathers; juvenile male may have some purple on forehead. Races differ mainly in amount and shade of mauve on cap: race *ocularis* and *speciosus* are

the most distinct, having purple area reduced to dark spot in front of eye; *speciosus* also lacks blue scapular spots, and breast band is only yellow in centre, being white at sides; *johannis* has pale cap.

Habitat. Typically found on outlying islands, rather than large land masses. Inhabits lowland forest, including secondary forest and gardens, in most of its range. On many larger islands in Solomons, occurs only above c. 750 m, where it replaces *P. superbus* and *P. viridis*.

Food and Feeding. Frugivorous, but no detailed information on diet. Feeds in both trees and shrubs; most frequently found singly and in pairs.

Breeding. Reported to breed throughout the year in Bismarck Archipelago. Typical flimsy fruit-dove nest in tree or shrub 3-15 m above the ground. Lays 1 white egg.

Movements. No information.

Status and Conservation. Not globally threatened. Locally common, e.g. on Biak and San Cristobal. Status on New Britain uncertain, but species may only be vagrant. As present species is typically found on small outlying islands, it may be locally vulnerable to extensive habitat loss and degradation, but some races at least seem well able to adapt to degraded habitat.

Bibliography. Andrew (1992), Beehler *et al.* (1986), Cain (1954a), Cain & Galbraith (1956), Coates (1985), Diamond (1975c), Eastwood (1995a), Gregory (1995c), Hadden (1981), Mayr (1945b), Meyer (1930), Rand & Gilliard (1967), Schodde (1977), Sujatnika *et al.* (1995).



252. Claret-breasted Fruit-dove

Ptilinopus viridis

French: Ptilope turvert **German:** Rotlatz-Fruchttaube **Spanish:** Tilopo Pechirrojo
Other common names: Red-bibbed/Red-breasted/Red-throated Fruit-dove

Taxonomy. *Columbus viridis* Linnaeus, 1766, Ambon.

Forms a superspecies with *P. eugeniae*; also allied to *P. rivoli* and *P. solomonensis*. Taxonomy of present species and *P. eugeniae* is confused, and the two are sometimes considered conspecific; some authors transfer races *vicinus* and *lewisii* to *P. eugeniae*; others grant species rank to *pectoralis*, incorporating *salvadorii*; race *geelvinkiana* also sometimes considered a distinct species. Six subspecies currently recognized.

Subspecies and Distribution.

P. v. viridis (Linnaeus, 1766) - S Moluccas, on Buru, Seram, Ambon, Haruku, Nusa Laut, Saparua and Seram Laut.

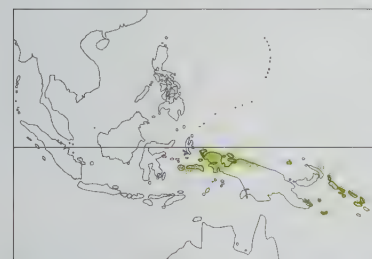
P. v. pectoralis (Wagler, 1829) - W Papuan Is (Waigeo, Misool, Kofiau, Gagi) and NW New Guinea E to Manokwari and Lobo Bay.

P. v. geelvinkiana (Schlegel, 1873) - Numfor, Biak and Meos Num in Geelvink Bay.

P. v. salvadorii (Rothschild, 1892) - Yapen I and N New Guinea from R Memberamo to Madang Province.

P. v. vicinus (Hartert, 1895) - Trobriand and D'Entrecasteaux Is.

P. v. lewisii (E. P. Ramsay, 1882) - Manus (Admiralty Is), Lihir Is and Nissan (Green Is) through Solomons (including Bougainville) E to Guadalcanal, Malaita and Ulawa.



Descriptive notes. 20-21 cm; 96 g. General plumage green with a sharply defined area of dark purplish crimson from lower throat to upper breast; chin, face, forehead and fore-crown bluish grey; small silver-grey patch on shoulder, silver-grey centres to some lower scapulars and tertials forming spots on inner edge of wing; greater wing-coverts and outer secondaries narrowly edged yellow; undertail-coverts and feathers of vent with broad yellow fringes; bill yellowish green, yellow or orange with red or deep orange base; legs dark red. Sexes similar, but female has less extensive breast patch, and greyish iris. Juvenile has grey

and red areas of head and breast much duller and less extensive, and has yellow fringes to most wing-coverts. Races differ mainly in amount of crimson on breast, reaching its greatest reduction in *vicinus*, *salvadorii* and *pectoralis*, all of which are sexually dichromatic, with red on breast reduced or absent in female; *pectoralis* male shows only a small red patch on breast and female's breast is entirely green; other races sexually monochromatic, *lewisii* with darker edged to bib and with silver markings paler and more conspicuous, *geelvinkiana* with paler, less extensive bib.

Habitat. Inhabits primary forest, secondary forest and forest edge, and sometimes lightly wooded cultivation and gardens. Mainly found in lowlands, but in New Guinea typically submontane at 600-1200 m; on Bougainville occurs up to 800 m, and replaced at higher elevations by *P. solomonensis*. Mostly frequents the canopy, sometimes coming lower at edges of clearings.

Food and Feeding. Frugivorous; no detailed information on diet. Often feeds in small flocks; aggressive at feeding trees, driving away others of its own species, as well as *P. superbus*, starlings (*Aplonis*) and cuckoo-shrikes (*Coracina*).

Breeding. A nest with an egg reported from Seram, in Dec; one with a chick from Bougainville, in Aug. Nest is a flimsy, open platform of sticks, placed on horizontal fork c. 3 m up (two records). Lays 1 egg.

Movements. No information.

Status and Conservation. Not globally threatened. Poorly known. Reported to be locally common, particularly on small islands. Moderately common in Moluccas. Apparently to some extent adaptable to disturbed habitats.

Bibliography. Andrew (1992), Beehler *et al.* (1986), Blaber (1990), Bowler & Taylor (1989), Cain (1954a), Cain & Galbraith (1956), Coates (1985), Coates & Bishop (1997), Diamond, J.M. (1985), Eastwood (1995a), Gibbs (1990), Gregory (1995c), Hadden (1981), Japson (1993), Mayr (1945b), Rand & Gilliard (1967), Ripley (1964), Rutgers & Norris (1970), Schodde (1977), Sibley (1951), Webb (1997), White & Bruce (1986).

253. White-headed Fruit-dove

Ptilinopus eugeniae

French: Ptilope d'Eugénie **German:** Schneekopf-Fruchttaube **Spanish:** Tilopo de Eugenia
Other common names: Eugene's Fruit-dove/Fruit-pigeon

Taxonomy. *Iotreron Eugeniae* Gould, 1856, Solomon Islands.

Forms a superspecies with *P. viridis*; also allied to *P. rivoli* and *P. solomonensis*. Taxonomy of *P. viridis* and present species is confused: some authorities consider them conspecific; others treat *P. v. vicinus* and *P. lewisii* as races of present species. Monotypic.

Distribution. E Solomons, on San Cristobal, Maluapaina and Uki.



Descriptive notes. 18-22 cm. Very similar to *P. viridis*, but differs in having entire head and upper throat white, more or less tinged with yellow; purplish crimson breast patch has an extensive dark purple border, and green of the underparts is duller, often with a grey or bluish tinge; bill yellow or greenish at tip, dull maroon at base; legs purplish red. Sexes alike. Juvenile has green feathers fringed with yellow; little or no red on breast; and white only around base of bill and upper throat.

Habitat. Inhabits lowland, hill and ridge forest; often seen in adjacent cultivated areas.

Food and Feeding. Frugivorous; no detailed information on diet.

Breeding. No information available.

Movements. No information available.

Status and Conservation. Not globally threatened. Currently considered near-threatened. Highly restricted range. Moderately common, especially in the foothills, but may in the future be threatened by degradation and loss of habitat. Organization of conservation priorities may be dependent to some extent on taxonomic clarification; in the meantime, population trends of all taxa within this superspecies should be monitored; research required.

Bibliography. Cain & Galbraith (1956), Dahl (1986), Hadden (1981), Mayr (1945b).

254. Orange-bellied Fruit-dove

Ptilinopus iozonus

French: Ptilope à ventre orange **German:** Orangebauch-Fruchttaube **Spanish:** Tilopo Ventrinaranja

Taxonomy. *Ptilinopus* [sic] *iozonus* G. R. Gray, 1858, Aru Islands.

Forms a superspecies with *P. insolitus*; these two form a species-group with *P. hyogaster* and *P. granulifrons*, and perhaps also *P. melanospila* and *P. nanus*. Five subspecies recognized.

Subspecies and Distribution.

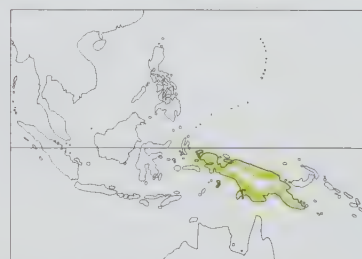
P. i. iozonus G. R. Gray, 1858 - Aru Is.

P. i. humeralis Wallace, 1862 - W Papuan Is and W New Guinea from Vogelkop E along S coast to R Fly.

P. i. iobensis (Schlegel, 1873) - Yapen I and N New Guinea from R Memberamo to Astrolabe Bay (including islands of Manam, Tarawai, Karkar and Kariru).

P. i. pseudohumeralis Rand, 1938 - upper R Fly, around junction of R Palmer and along R Black.

P. i. finschi Mayr, 1931 - Huon Peninsula and R Fly to SE New Guinea.



Descriptive notes. 20-22 cm; 105-112 g. General colour green, with a large orange patch on belly; undertail-coverts and vent yellow or white, marked with green; small greyish mauve patch on bend of wing; secondaries and greater-coverts narrowly edged yellow; primaries dark iridescent green; blue-grey spots on lower back; tail dark green with grey-green terminal band; bill dark grey with cream-coloured tip; legs bright purple. Female similar but with less bronzy tinge to green plumage and more pronounced grey tinge on chin. Juvenile lacks adult's grey and orange markings, and has narrow yellow fringes to most green feathers, and

broad yellow ones to those of belly patch area. Race *finschi* very similar but with grey throat; *iobensis* differs only in greener throat and poorly marked apical tail band; *humeralis* and *pseudohumeralis* both have mauve-grey feathers on bend of wing broadly edged with dark purple, and grey spots on wing.

Habitat. Inhabits a variety of forest types and wooded areas, especially open habitats; typically in second growth, forest edge, mangroves, gallery woodland and savanna near forest; less commonly in primary forest. Found primarily in the lowlands, locally up to 1000 m.

Food and Feeding. Frugivorous; depends on figs (Moraceae) for most of its food; near Port Moresby, various figs together constituted 84% of diet by volume; other important food sources include palms (Arecaceae), nutmeg (Myristicaceae) and Annonaceae. A gregarious species, often found in flocks of dozens, up to 60 or more; congregates in the canopy of fruiting trees, often in the company of other species.

Breeding. Apparently occurs all year round: morphological data indicate that, although gonad size peaks in late dry season (Nov-Dec), both males and females are in reproductive condition in all months; nest building high in mangroves mid-Mar at Bintuni Bay (S Vogelkop). Nests rarely found, apparently because typically built high in forest; nest building seen 13-21 m up in trees at forest edge; a few nests also found only 3 m up; nest is slight platform of twigs. Lays 1 white egg.

Movements. Little information; reported to be mainly sedentary, and to undertake only local movements in response to food supply.

Status and Conservation. Not globally threatened. Common in many areas, locally even abundant; common in lowlands of Papua New Guinea, where is usually the most abundant member of the genus. Tolerance of, and even preference for, relatively open areas and secondary forest, together with frequent appearance in the vicinity of towns, should ensure survival of this species.

Bibliography. Andrew (1992), Bailey (1992a), Baptista (1990), Beehler (1978b), Beehler *et al.* (1986), Bell (1970a, 1982), Bellchambers *et al.* (1994), Cain (1954a), Clapp (1987b), Coates (1985), Diamond (1972a, 1975c), Erftemeijer *et al.* (1991), Frith, Braithwaite & Wolfe (1974), Frith, Crome & Wolfe (1976), Gregory (1995a, 1995b), Greig-Smith (1978), Mayr & Rand (1937), Mees (1982a), Rand (1942a), Rand & Gilliard (1967), Ripley (1964), Rutgers & Norris (1970), Wahlberg (1992), Watson *et al.* (1962).

255. Knob-billed Fruit-dove

Ptilinopus insolitus

French: Ptilope casqué **German:** Knopffruchttaube **Spanish:** Tilopo Insólito
Other common names: Red-knobbed/Knob-billed Orange-bellied Fruit-dove; Knob-billed Fruit-pigeon

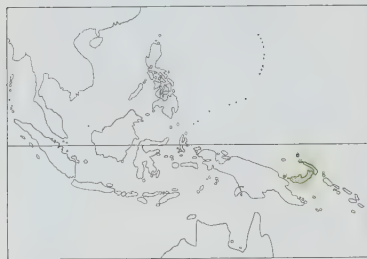
Taxonomy. *Ptilopus insolitus* Schlegel, 1863, New Caledonia; error = New Ireland.

Forms a superspecies with *P. iozonus*; these two form a species-group with *P. hyogaster* and *P. granulifrons*, and perhaps also *P. melanospila* and *P. nanus*. Two subspecies recognized.

Subspecies and Distribution.

P. i. inferior Hartert, 1924 - Mussau and Emira in St Matthias Group (N Bismarck Archipelago).

P. i. insolitus (Schlegel, 1863) - Bismarck Archipelago from New Hanover, Djaul, New Ireland and Tabar, Lihir and Feni Is through Watom and Duke of York I to New Britain and Lolobau, and W through Sakar, Umboi, Tolokiwa and Long to Crown I.



Descriptive notes. 22-24 cm; 115-144 g. Closely resembles *P. iozonus*, but has greatly enlarged red cere, forming a knob on front of head; also, spots on inner edge of wing and tail band are pale silvery grey, and more extensive than in *P. iozonus*; silvery grey shoulder patch extends into a narrow line of grey along edge of folded wing; bill pale greenish yellow; legs purplish red. Sexes alike. Juvenile undescribed. Race *inferior* smaller with russet patch on sides of neck and adjacent lesser wing-coverts.

Habitat. Occupies variety of forest habitats, including forest edge and disturbed areas, and

sometimes the vicinity of villages. Found from sea-level up to 1200 m on New Britain, and up to at least 700 m on New Ireland.

Food and Feeding. Frugivorous; no detailed information available on diet, but known to eat figs. Often congregates in fruiting trees.

Breeding. Probably breeds throughout the year. Nest typical of genus, a slight platform of twigs, placed in a tree or shrub with thick foliage. Lays 1 white egg; at one nest, incubation was 19 days, fledging 14 days.

Movements. No information.

Status and Conservation. Not globally threatened. Reported to be common throughout most of its range, although status on many small islands very poorly known; seems to be less common in St Matthias Group. Appears to adapt well to disturbed forest habitats, and also frequently seen around human habitation.

Bibliography. Berggy (1978), Cain (1954a), Coates (1985), Diamond (1975c), Eastwood (1995c), Meyer (1930, 1933).

256. Grey-headed Fruit-dove

Ptilinopus hyogaster

French: Ptilope hyogastre **German:** Blaukopf-Fruchttaube **Spanish:** Tilopo Cabecigrís
Other common names: Purple-bellied Fruit-dove

Taxonomy. *Columba hyogastra* Temminck, 1824, Sulawesi; error = Halmahera.

Forms a superspecies with *P. granulifrons*; these two form a species-group with *P. iozonus* and *P. insolitus*, and perhaps also *P. melanospila* and *P. nanus*. Species name often erroneously given as *hyogastra*, but maintenance of original gender is unjustified. Monotypic.

Distribution. N Moluccas, on Morotai, Halmahera, Ternate, Tidore, Kasiruta and Bacan.



Descriptive notes. 20-23 cm. Plumage generally green; head pale bluish grey; two pale bluish grey patches on shoulder and across wing; a large dark purple patch on belly and bright yellow undertail-coverts and vent; bill greyish or whitish blue at base, yellow at tip; legs dark grey to greyish purple. Sexes alike. Juvenile apparently undescribed.

Habitat. Forest and woodland, apparently not requiring heavy cover, and often frequenting secondary forest and cultivated areas; generally avoids villages. Mainly frequents the lowlands but recorded up to 1000 m.

Food and Feeding. No information; some-

times gathers in sizeable flocks of 20 birds or more.

Breeding. Reported to be in breeding condition in Oct on Halmahera.

Movements. No information.

Status and Conservation. Not globally threatened. Generally fairly common, locally abundant at least on Halmahera, where it is the most frequently seen fruit-dove; common on Morotai. Research required.

Bibliography. Andrew (1992), Cain (1954a), Coates & Bishop (1997), Gibbs (1990), Lambert (1994b), Ripley (1959), Sujatnika *et al.* (1995), White & Bruce (1986).

257. Carunculated Fruit-dove

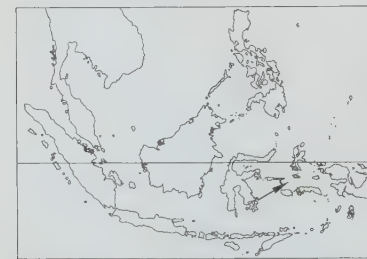
Ptilinopus granulifrons

French: Ptilope carunculé **German:** Karunkelfruchttaube **Spanish:** Tilopo Carunculado
Other common names: Obi/Wattled Fruit-dove

Taxonomy. *Ptilinopus granulifrons* Hartert, 1898, Obi Major.

Forms a superspecies with *P. hyogaster*; these two form a species-group with *P. iozonus* and *P. insolitus*, and perhaps also *P. melanospila* and *P. nanus*. Monotypic.

Distribution. Obi (C Moluccas).



Descriptive notes. 20-23 cm. Closely resembles *P. hyogaster* except for cere, which is developed into a set of protuberant fleshy knobs; head and patches on scapulars and inner wing-coverts silver-grey; patch on belly deep purple edged with deep yellow which shades to pale yellow on undertail-coverts and vent; rest of plumage green strongly tinged with golden yellow, especially on neck and breast; bill yellow at tip, crimson on anterior flat part of cere and buffy orange on protuberant part of cere. Sexes alike in plumage but female has more greenish on bill; iris red in male, yellow in female. Juvenile apparently undescribed.

Habitat. Forest, including secondary forest, forest edge and agricultural land. Probably confined to the lowlands below 550 m.

Food and Feeding. No information available.

Breeding. No information available.

Movements. No information available.

Status and Conservation. **VULNERABLE.** Found to be widely distributed but apparently scarce in a 1992 survey. The only proposed protected area on Obi includes land at 500 m or above, and so probably affords little suitable habitat for this species; lowland forests on Obi are in selective logging concessions. Biology and ecology virtually unknown; extensive research and surveys required in order to establish population size and ecological requirements; some areas of lowland forest on the island must be preserved.

Bibliography. Andrew (1992), Cain (1954a), Coates & Bishop (1997), Collar & Andrew (1988), Collar *et al.* (1994), Hartert (1903a), Lambert (1994b), Linsley (1995), Sujatnika *et al.* (1995), White & Bruce (1986).

258. Black-naped Fruit-dove

Ptilinopus melanospila

French: Ptilope turgris **German:** Schwarzkappen-Fruchttaube **Spanish:** Tilopo Nuquinegro
Other common names: Black-headed Fruit-dove, Black-naped Fruit-pigeon

Taxonomy. *Jotreron melanospila* Salvadori, 1875, Menado, Sulawesi.

A distinctive form of uncertain affinities; probably most closely allied to the species-group which includes *P. iozonus*, *P. insolitus*, *P. hyogaster* and *P. granulifrons*; *P. nanus* is sometimes included in this group. At least eleven races have been described based on slight differences in size and coloration; further study needed to establish which, if any, of these forms merit subspecific rank. Has been erroneously listed as *P. melanocephalus*. Five subspecies tentatively recognized.

Subspecies and Distribution.

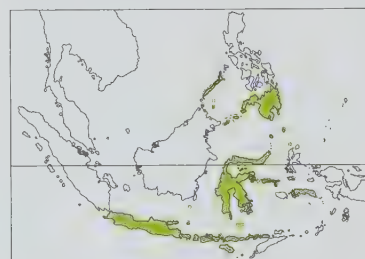
P. m. bangueyensis (A. B. Meyer, 1891) - S Philippines (Palawan, Cagayan Sulu, Mindanao, Basilan, Sulu Is, Tawitawi, Bongao, Sibutu) and islands N of Borneo (Balambangan, Banggi).

P. m. xanthorrhoea (Salvadori, 1875) - Talaud and Sangihe Is (N of Sulawesi) and Doi (N Moluccas).

P. m. melanospila (Salvadori, 1875) - Sulawesi and islands off NE (Manadotua, Manterawu, Talisei, Bangka, Lembah) and E (Togian).

P. m. chrysorrhoea (Salvadori, 1875) - Banggai and Sula Is, and Obi and Seram in C Moluccas.

P. m. melanauca (Salvadori, 1875) - Matasiri (S of Borneo) and Kangean Is, Java and Bali E through Lesser Sundas to Alor, and islands S of Sulawesi (Salayar, Muna, Butung, Tukangbesi, Tanahjampea, Kalao, Kalaotoa, Madu).



Descriptive notes. 21-27 cm; 92-120 g. Silvery grey head with black nape and yellow throat patch; lower breast and upperparts green or greenish yellow; vent yellow, red or orange; longer undertail-coverts bright purplish red, shorter ones yellow or orange with red tips; bill greenish yellow; legs red. Female overall green except for red or yellow undertail-coverts and yellow edges to flight feathers and lower belly. Juvenile resembles adult female but has more conspicuous yellow edges to most feathers. Races vary slightly in size and colour, primarily in orange or yellow of vent.

Habitat. Inhabits forest, forest edge and

patches of scrub or forest in open country; will visit isolated trees in open country for feeding; also frequents agricultural areas and suburban parks and gardens; mangroves important on small islands. Found from sea-level up to 800 m, up to 1600 m in C Sulawesi. In many places mainly found along coast and on small islands.

Food and Feeding. Little information; known to take fruits and berries from branches.

Breeding. Nesting reported Feb-Sept and Dec on Java; Sept on Butung; May on Sumbawa. Builds a simple platform of twigs typical of the genus, usually placed low down. Lays 1 white egg. In captivity: incubation 18-26 days; fledging 8-14 days.

Movements. No information, but recent records on small islands where previously unknown suggest that species may be nomadic, capable of flight of considerable distance over sea. Flight swift, with a loud whirring.

Status and Conservation. Not globally threatened. Generally common on larger islands of Java, Bali and Sulawesi, but also on medium-sized islands. In conjunction with apparent nomadic tendencies, relative abundance appears to fluctuate locally; species may be expanding its range. Single record off S Sumatra in Apr 1976, a pair seen on small island in Lampung Bay; no subsequent surveys of the islands in this bay, and record has been considered possibly referable to vagrants, but more probably refers to resident population.

Bibliography. Bishop (1992), Bohmke (1990), Cain (1954a), Coates & Bishop (1997), Delacour & Holmes (1946), Dickinson *et al.* (1991), Gibbs (1990), Hall (1994), Hellebrekers & Hoogerwerf (1967), Holmes (1996), Mayr & van Balen (1996), MacKinnon (1988), MacKinnon & Philipps (1993), Mayr (1944b), Rozendaal & Dekker (1989), Rutgers & Norris (1970), Smythies (1981), Stresemann (1941), Watling (1983), Wells (1985), White & Bruce (1986), Whitten *et al.* (1987).

259. Dwarf Fruit-dove

Ptilinopus nanus

French: Ptilope nain **German:** Zwergfruchttaube **Spanish:** Tilopo Enano
Other common names: Least/Little/Small Green/Small Fruit-dove

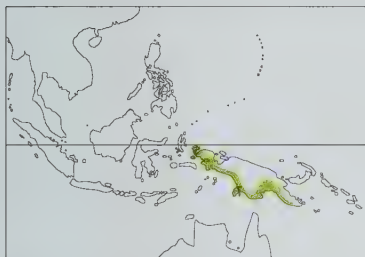
Taxonomy. *Columba naina* [sic] Temminck, 1835, Lobo Bay, New Guinea.

Affinities uncertain; has been placed in the species-group which includes *P. iozonus*, *P. insolitus*, *P. hyogaster*, *P. granulifrons* and perhaps *P. melanospila*; however, inclusion in this group may not be supported by available evidence. Races probably represent no more than the extremes of a W-E size cline. Species name emended by Temminck himself in a subsequent publication. Two subspecies tentatively recognized.

Subspecies and Distribution.

P. n. minimus Stresemann & Paludan, 1932 - W Papuan Is, on Waigeo, Misool, Batanta and Salawati. *P. n. nanus* (Temminck, 1835) - S New Guinea from Lobo Bay to Port Moresby.

Descriptive notes. 13-15 cm; 49 g. Smallest fruit-dove; generally green with yellow edges to secondaries and scapulars forming three yellow bands on closed wing; inner wing-coverts and inner secondaries tending to a more bluish green, this colour being most pronounced on scapulars; a dark purple patch on belly, a grey patch each side of upper breast and bright yellow lower abdomen and undertail-coverts; bill yellowish green; legs purplish red. Female similar but lacks purple patch on belly and grey on breast. Juvenile like female but with yellow fringes to most feathers. Race *minimus* averages smaller.



Habitat. Inhabits forest; also visits fruiting trees in clearings and partly cleared areas. Occurs in lowlands and hills up to 1100 m; may be commonest in the hills.

Food and Feeding. Frugivorous, but little detailed information available; 8 birds collected near Port Moresby had eaten only figs (Moraceae); also reported to feed on nectar.

Breeding. Nests found Sept and Nov. A nest under construction was located 12 m up in the outer foliage of a small tree, and placed on top of dead leaves lodged in an outer fork of a branch; twigs were being brought by male to female, while she waited on the nest; another

nest was only 3 m above the ground. No further information available.

Movements. Little information; apparently sedentary near Port Moresby, but reported to be highly nomadic at Tabubil (CS New Guinea).

Status and Conservation. Not globally threatened. Scarce but apparently not rare; rather locally distributed and inconspicuous, so often overlooked; sometimes locally common; present in Varirata National Park, near Port Moresby. Research required.

Bibliography. Andrew (1992), Anon. (1994a), Bailey (1992a), Beehler *et al.* (1986), Cain (1954a), Coates (1985), Diamond (1972a, 1975c), Eastwood (1995b), Frith, Crome & Wolfe (1976), Gregory (1995a, 1995b), Rand & Gilliard (1967), Ripley (1964).

260. Negros Fruit-dove

Ptilinopus arcanus

French: Ptilope de Ripley

German: Negrosfruchttaube

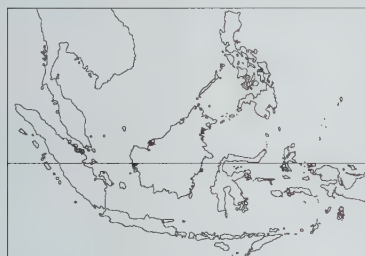
Spanish: Tilopo de Negros

Other common names: Ripley's Fruit-dove

Taxonomy. *Ptilinopus arcanus* Ripley and Rabor, 1955, Pula, Mt Canlaon, Negros.

Affinities unknown; it has been suggested that the single specimen represents a runt individual of *P. occipitalis* or is of hybrid origin. Monotypic.

Distribution. Known only from Mt Canlaon, NC Negros, Philippines.



Descriptive notes. 16.5 cm. Only female known. A vivid rather dark green fruit-dove with ashy grey forehead; broad yellow fringes to the greater coverts and tertials produce a narrow but conspicuous bar on folded wing; throat whitish; yellow undertail-coverts; in the dried specimen extensive bare orbital skin yellowish; bill blackish; legs purplish red.

Habitat. The single specimen was collected in a large fruiting tree in a clearing at an altitude of 1200 m.

Food and Feeding. No information available.

Breeding. No information available.

Movements. No information available.

Status and Conservation. **CRITICALLY ENDANGERED.** May be extinct; the single specimen collected in 1953 is still the only definite record, although two individuals probably of this species were seen at the same time. Fieldwork at the type locality in 1991 failed to find the bird. Intensive hunting and habitat destruction continue in the area; all forest below 750 m has been cleared. As only known from type locality, where subsequent survey work has drawn a blank, this form is likely to be extinct or very nearly so, if indeed it really is a species and not some kind of aberrant form. Additional exhaustive surveys required in the area as soon as possible, in case this form does survive and is a valid species; in such a case, conservation requirements are almost certainly urgent.

Bibliography. Brooks *et al.* (1992), Collar & Andrew (1988), Collar *et al.* (1994), Dickinson *et al.* (1991), DuPont (1971), Evans, Dutson & Brooks (1993), Mayr (1957), Ripley & Rabor (1955).

261. Orange Dove

Ptilinopus victor

French: Ptilope orange

German: Orangetaube

Spanish: Tilopo Naranja

Other common names: Flame Dove

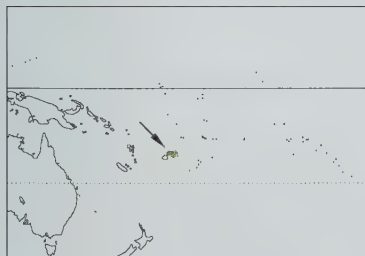
Taxonomy. *Chrysena victor* Gould, 1872, Vanua Levu, Fiji.

Formerly placed in monospecific subgenus *Chrysophaps*, but this was based on characters now shown to be shared with both *P. luteovirens* and *P. layardi*; all three now considered to form a distinctive Fijian superspecies in the subgenus *Chrysoena*, which is sometimes accorded full genus status, and is thought to represent an early colonization of Fiji by *Ptilinopus* stock. Races of dubious validity, with intermediate populations. Two subspecies recognized.

Subspecies and Distribution.

P. v. victor (Gould, 1872) - N Fiji, on Vanua Levu, Rabi, Kioa and Taveuni.

P. v. aureus Amadon, 1943 - NE Fiji, on Qamea and Laucala.



Descriptive notes. 17-20 cm. Vivid fiery orange, slightly darker on mantle and back; contour feathers have a loose hairy appearance and texture; flight feathers have an olive-grey tinge and are edged bright yellow; head dark greenish yellow, paler on throat; bill and legs yellowish green. Female uniformly dark green with a pale greenish yellow head, dark yellow undertail-coverts and dark flight-feathers; shows only a hint of loose hairy plumage texture. Juvenile uniformly green; young male acquires a subadult plumage which closely resembles female; shows only a hint of loose hairy plumage texture; when moulting into

adult plumage, young males have bizarre appearance, either green with orange spots, or bright orange blotched with green. Race *aureus* larger, with brighter upperparts.

Habitat. Occupies woodland; prefers more open forest, including primary, secondary and gallery forest. Mainly sub-montane, occurring between 420 and 980 m.

Food and Feeding. Primarily frugivorous, eating a variety of small fruits and berries; females have been observed feeding on caterpillars taken from leaves. Feeds in forest understorey and in the canopy.

Breeding. Nesting recorded in Jun, Sept, Nov and Dec. Nest is a flimsy platform of bare twigs; one nest was 2.5 m up in a small tree. Usually 1 white egg, clutches of 2 eggs have been reported; limited observations suggest that only the female incubates.

Movements. No information. Flight fast and direct, with whirring wingbeats.

Status and Conservation. Not globally threatened. No precise details available, but species reported to be fairly common throughout its restricted range. Extensive research recommended for all members of this distinctive superspecies.

Bibliography. Amadon (1943), Blackburn (1971), Clunie (1984), Dahl (1986), Holyoak (1979), Layard (1876), Mayr (1945b), Ornstein & Bruce (1976), Pratt *et al.* (1987), Rutgers & Norris (1970), Watling (1982a), Wood & Wetmore (1925).

262. Golden Dove

Ptilinopus luteovirens

French: Ptilope jaune

German: Goldtaube

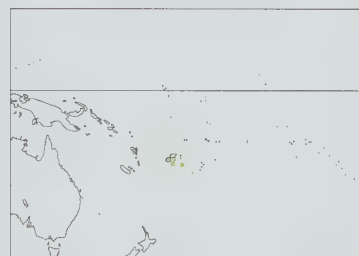
Spanish: Tilopo Dorado

Other common names: Lemon(!)/Yellow Dove

Taxonomy. *Columba luteovirens* Hombron and Jacquinot, 1841, Ovalau, Fiji.

Sometimes placed in genus or subgenus *Chrysoena*, which forms a distinctive Fijian superspecies also including *P. victor* and *P. layardi*; these three are thought to represent an early colonization of Fiji by *Ptilinopus* stock. Monotypic.

Distribution. WC Fiji, on Waya Group, Vitu Levu, Beqa, Ovalau and Gau.



Descriptive notes. 19-21 cm. Generally pale greenish gold, with long overlapping contour feathers, giving a distinctive velvety texture to plumage; head, flight-feathers and tail slightly darker; bill and legs bright emerald green. Female bright green, with greenish yellow head; underparts, except breast, fringed with buffy yellow; undertail-coverts yellow. Juvenile similar to female.

Habitat. Found in mature forest, secondary forest and scrub, occasionally close to villages. Found at wide range of altitudes, 60-2000 m.

Food and Feeding. Primarily frugivorous, eating a variety of small fruits and berries; reported

foods include figs (*Ficus*, Moraceae), *Clidemia* (Melastomataceae) and *Solanum torvum* (Solanaceae); one report of a female taking insects from twigs and leaves. Food taken from the canopy to the understorey.

Breeding. Nest is a flimsy structure of bare twigs and vine tendrils, placed fairly low in a tangle of vines or a dense shrub; one observation of a female building a nest, apparently alone. Lays 1 white egg.

Movements. Will cross extensive areas of grassland to reach brush-covered limestone outcrops. Flight is rapid and direct, with whirring wingbeats.

Status and Conservation. Not globally threatened. No precise details available, but species reported to be common and widespread, especially on Viti Levu. Appears to be relatively adaptable in terms of habitat selection. Extensive research recommended for all members of this distinctive superspecies.

Bibliography. Amadon (1943), Bahr (1912), Clunie (1984), Dahl (1986), Gorman (1975), Holyoak (1979), Mayr (1945b), Pratt *et al.* (1987), Watling (1982a), Wood (1924b).

263. Whistling Dove

Ptilinopus layardi

French: Ptilope de Layard

German: Smaragdtaube

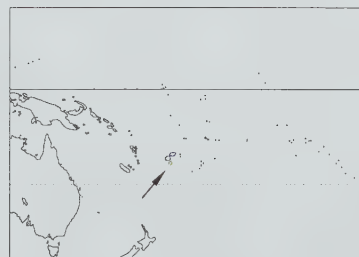
Spanish: Tilopo de la Kadavu

Other common names: Yellow-headed/Velvet/Kadavu Dove

Taxonomy. *Ptilinopus layardi* Elliot, 1878, Kadavu, Fiji.

Sometimes placed in genus or subgenus *Chrysoena*, which forms a distinctive Fijian superspecies also including *P. victor* and *P. luteovirens*; these three are thought to represent an early colonization of Fiji by *Ptilinopus* stock. Monotypic.

Distribution. SW Fiji, on Kadavu and Ono.



Descriptive notes. 19-20 cm. Uniformly green except for a greenish yellow head, white centre of lower belly, and yellow undertail-coverts; feathers of mantle, lower neck and upper breast with golden fringes; contour feathers have loose, velvety texture. Female resembles male, but head is dark olive green, browner than body plumage. Juvenile like female but with broader yellow fringes to wing feathers.

Habitat. Usually found in well forested areas in the lowlands, but sometimes also enters gardens in villages.

Food and Feeding. Mainly frugivorous, but no detailed information on diet; also reported

to take caterpillars and small insects. Feeds from just above the ground up into the canopy.

Breeding. The few records are all from the second half of the year. Nest is a slight platform of twigs or pieces of vine, 10-12 cm in diameter; one nest was 3 m above the ground. Lays 1 white egg; limited information suggests that only the female broods the young.

Movements. No information on movements or home range. Flight swift and direct with whirring wing-beats.

Status and Conservation. Not globally threatened. Currently considered near-threatened. No precise details available, but species is apparently common within its limited range. Extensive research recommended for all members of this distinctive superspecies.

Bibliography. Amadon (1943), Beckon (1982), Clunie (1984), Dahl (1986), Fisher & Longmore (1995), Mayr (1945b), Pratt *et al.* (1987), Watling (1982a).

Genus *DREPANOPTILA* Bonaparte, 1855

264. Cloven-feathered Dove

Drepanoptila holosericea

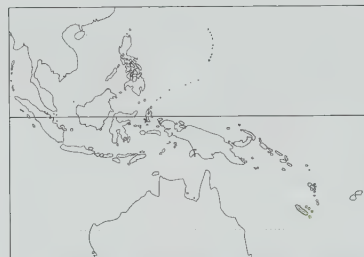
French: Ptilope vlouvlou **German:** Spaltschwingentaube **Spanish:** Tilopo de Nueva Caledonia

Taxonomy. *Columba Holosericea* Temminck, 1810, Sandwich Island (= Éfaté, S Vanuatu); error = New Caledonia.

A very distinctive monotypic genus characterized by notched primaries and short, very rounded wings; closely allied to *Ptilinopus*, perhaps most closely to those of proposed subgenus *Chrysoena*, *P. victor*, *P. luteovirens* and *P. layardi*. Monotypic.

Distribution. New Caledonia and I of Pines.

Descriptive notes. Male 32 cm, 220 g; female 28 cm, 160 g. Plump, compact shape with short, rounded wings and very short broad tail; primaries notched. General colour a rich green with a silvery tinge on outer webs of primaries and silvery white subterminal areas on most of wing, tail-coverts and central rectrices; these pale markings form transverse bands across bird, creating an odd and distinctive effect; chin and line down centre of throat white, as are dense, fluffy leg feathers; green of breast divided from deep greenish yellow belly patch by untidy narrow white band with a broader black one beneath; undertail-coverts bright yellow; bill dark green; legs dull red. Female smaller, with less clearly defined markings; green of plumage tinged yellow. Juvenile lacks "frothy" bands; wing feathers have broad yellow fringes.



Habitat. Native forests, including dense forest; also open woodland, and niaouli savanna dominated by *Melaleuca quinquenervia*.

Food and Feeding. Little information; feeds on fruits and berries including those of figs and aralid trees.

Breeding. Breeds Aug-Nov. Nest is a flimsy platform of twigs, placed in a tree or shrub. Reported to lay 2 eggs, which would be unusual for a fruit pigeon. In captivity: lays 1 egg; incubation 21 days; female alone incubates egg and cares for young; young can fly well by 21 days.

Movements. No information on home range or movements. Flight sound is unusual, described as a quite loud "half-whistled, half-whooshing wish-whish-whish".

Status and Conservation. **VULNERABLE.** Population estimated in 1993 to be over 5000 birds, but appears to be declining; species is still common in the north of New Caledonia; rare in the south, with only c. 30 birds in Rivière Bleue Park in early 1990's; I of Pines holds a small population. As native forests are cleared by logging and for nickel mines, present species is being heavily hunted and trapped. Species requires strict and effective protection; more protected areas must be set aside to preserve the island's remarkable native flora and fauna.

Bibliography. Collar & Andrew (1988), Collar *et al.* (1994), Dahl (1986), Hannecart (1988), Hannecart & Létocart (1980), Hay (1986), King (1978/79), Layard (1880), Layard & Layard (1882), Mayr (1945b), Quinque (1985), Stokes (1980), Zisweiler (1969).



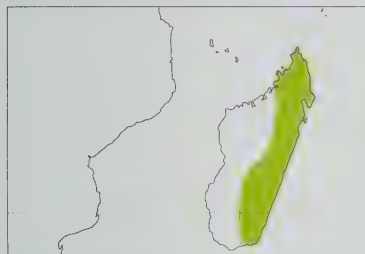
Genus *ALECTROENAS* G. R. Gray, 1840

265. Madagascar Blue-pigeon

Electroenas madagascariensis

French: Founingo bleu **German:** Madagaskarfruchttaube **Spanish:** Paloma Azul Malgache
Other common names: Madagascar Blue Fruit-dove, Red-tailed Blue-pigeon

Taxonomy. *Columba madagascariensis* Linnaeus, 1766, Madagascar.
Forms a superspecies with *A. szanzini* and *A. pulcherrima*. Monotypic.
Distribution. N & E Madagascar.



Descriptive notes. 25-28 cm. Throat and neck silvery blue grey; upperparts dark blue, silvery grey upper mantle; underparts dark blue, but breast silvery blue-grey and undertail-coverts blood red; rectrices blood red except for outermost ones, which are extensively blue-black with blood red tips; wings dark blue above, brown-grey below; iris green-yellow surrounded by a red ring; large area of bare red skin around eye; bill greenish with yellow tip; tarsus partially feathered, red, toes red. Sexes alike. Juvenile has smaller area of bare skin around eye; mainly dark bluish green with narrow pale fringes to many feathers and absence

of grey tinge on breast and nape.

Habitat. Mostly in E Madagascar, from sea-level up to 2000 m in undisturbed rain forest and degraded forest surrounding towns and villages. Frequents tree tops and often observed above the forest canopy, perched on projecting snags.

Food and Feeding. Virtually nothing known; plucks fruit from bushes or trees. Usually observed in pairs, but sometimes in groups of 3-12 birds.

Breeding. Recorded Oct-Dec. Nest is a platform of interlaced twigs placed on a horizontal tree fork, 6-20 m above ground. Lays 1 white egg.

Movements. Seasonal movements into the western region of the island have been noted, where species apparently arrives during the rains, Nov-Dec. In addition, reported to descend to the plains during Mar-Jul; also, absent from NW of the island for part of the year. Further research on the species' altitudinal or seasonal movements is clearly required.

Status and Conservation. Not globally threatened. Widely distributed through NW & E Madagascar, with old records from the SW coast and W savanna; in E, apparently less common on coastal plain. Fairly common in a number of protected areas, e.g. Mantadia and Ranomafana National Parks, and Analamazaotra Special Reserve (Perinet). Will use primary forest that has been partially exploited. Locally, populations may have been reduced as a result of hunting pressure. Research and population monitoring required.

Bibliography. Albignac (1970), Bangs (1918), Benson *et al.* (1976-1977), Berlioz (1948), Dee (1986), Delacour (1932a), Dowsett & Forbes-Watson (1993), Langrand (1990), Milon *et al.* (1973), Rand (1936), Rösler (1996), Steinbacher (1977), Stresemann (1952), Thorstrom & Watson (1997).

266. Comoro Blue-pigeon

Electroenas szanzini

French: Founingo des Comores **Spanish:** Paloma Azul de las Comores
German: Komorenfruchttaube
Other common names: Comoro Blue Fruit-dove

Taxonomy. *Funigus szanzini* Bonaparte, 1854, Comoro Islands.
Forms superspecies with *A. madagascariensis* and *A. pulcherrima*. Two subspecies recognized.

Subspecies and Distribution.
A. s. minor Berlepsch, 1898 - Aldabra Is.
A. s. szanzini (Bonaparte, 1854) - Comoro Is, on Ngazidja (Grand Comoro), Ndzuani (Anjouan) and Maore (Mayotte).



Descriptive notes. 27 cm; male 134-158 g, female 171 g. Head, neck and upper breast silvery grey, neck feathers deeply bifurcated and very long; rest of plumage blackish blue, with silvery wash on mantle and wing quills; outer primaries deeply indented on inner web and recurved at tip; iris yellow surrounded by red ring; orbital skin purplish red; bill olive green with pale tip; legs and feet greyish blue. Female usually slightly duller, many feathers with narrow pale yellow fringes. Juvenile has silvery grey areas of adult greenish grey; eyes and orbital skin dull.

Habitat. Inhabits evergreen forest, with altitude range of 500-1500 m on Ngazidja; also found at sea-level in mangroves.

Food and Feeding. Feeds on a variety of berries and fleshy fruit, notably figs (*Ficus*) and nuts of takamaka tree (*Calophyllum tacamahaca*). In E Aldabra, groups of up to 20 individuals may be seen feeding on one tree.

Breeding. Birds in breeding condition Sept-Nov; season probably notably longer. Nest is typical pigeon platform, usually 1-6 m above ground, well concealed in fork of a tree (often a mangrove). Lays 1 egg.

Movements. Sedentary.

Status and Conservation. Not globally threatened. Extinct on several of smaller Comoro Is and numbers reduced on others, e.g. Mwali, due to hunting pressure. Numbers have also been reduced considerably in Aldabra since the arrival of humans; species now protected there; in Aldabra, uncommon in W but common in E. In Comoros, regarded as common on Ngazidja, where population in 1980's was apparently unchanged since late 1950's; the species remains numerous, even in logged forests, suggesting that its prospects for future survival here, and on Ndzuani, appear reasonable, given that habitat loss is the single most important threat to most endemic bird taxa in the archipelago.

Bibliography. Benson (1960, 1967), Benson & Penny (1971), Dowsett & Forbes-Watson (1993), Frith, C.B. (1977), Gaymer (1967), Louette (1988, 1992), Louette & Stevens (1992), Louette *et al.* (1988), Penny (1974), Rösler (1996), Skerrett (1996), Stevens, Herremans & Louette (1992), Stevens, Louette *et al.* (1995).

267. Seychelles Blue-pigeon

Electroenas pulcherrima

French: Founingo rougecap **German:** Warzenfruchttaube **Spanish:** Paloma Azul de Seychelles
Other common names: Red-crowned/Warty-faced Blue-pigeon, Red-crowned Wart-pigeon, Seychelles Blue Fruit-dove

Taxonomy. *Columba pulcherrima* Scopoli, 1786, Antigua, Panay (Philippines); error = Seychelles. Forms a superspecies with *A. madagascariensis* and *A. szanzini*. Monotypic.

Distribution. Seychelles, on Praslin, Felicite, Silhouette, Frigate, Marianne and Mahé.



Descriptive notes. c. 24 cm; 161-165 g. Throat, sides of face and nape light grey becoming silvery grey on neck and breast; neck feathers bifurcated and attenuated; rest of plumage blackish blue, primaries with silvery tinge; bare orbital skin has wart-like projections, extending to gape, with warts also on base of lower mandible; entire orbital skin bright red; legs and feet grey. Sexes similar. Juvenile largely bronzy olive green with yellow edgings to feathers and brownish orbital skin; grey areas of adult paler.

Habitat. Occurs in remaining stands of montane forest, notably on Praslin, but also in

remote parts of Mahé, Frigate and Silhouette.

Food and Feeding. Takes fruits and berries, notably wild guavas (*Psidium*), cinnamon berries and nuts of takamaka (*Calophyllum tacamahaca*); seeds are ground in the muscular gizzard and then digested.

Breeding. No data available on seasonality. Constructs a typical pigeon platform; female builds unaided by male. Usually 1 egg, occasionally 2; the fact that species takes some seeds may account for occasional clutches of 2 eggs (see page 88); incubation 28 days; both sexes incubate eggs and feed young; fledging 14 days.

Movements. Sedentary.

Status and Conservation. Not globally threatened. Due to overhunting and the fact that fruit groves are no longer important aspects of local agriculture, the species is less common than in past; populations require monitoring.

Bibliography. Bullock (1990), Delacour (1913, 1929), Diamond, A.W. (1985a), Diamond, A.W. & Feare (1980), Dowsett & Forbes-Watson (1993), Gaymer *et al.* (1969), Lionnet (1980), Penny (1974), Rösler (1996), Rutgers & Norris (1970), Skerrett (1994, 1996), Vesey-Fitzgerald (1940).

Genus *DUCULA* Hodgson, 1836

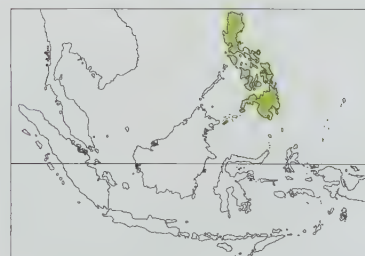
268. Pink-bellied Imperial-pigeon

Ducula poliocephala

French: Carphophage à ventre rose **German:** Graukopf-Fruchttaube **Spanish:** Dúcula Ventrirrosa
Other common names: (Philippine) Zone-tailed Pigeon

Taxonomy. *Carpophaga poliocephala* G. R. Gray and Mitchell, 1844, Luzon, Philippines.

Forms superspecies with *D. forsteri*, with which sometimes considered conspecific; also closely related to *D. mindorensis* and *D. radiata*; this species-group may form a link between *Ptilinopus* fruit-doves and other imperial-pigeons. Monotypic.



Distribution. Philippines, on Luzon, Catanduanes, Mindoro, Sibuyan, Masbate, Samar, Panay, Negros, Cebu, Bohol, Leyte, Dinagat, Mindanao, Basilan and Tawitawi.

Descriptive notes. 42 cm; male 510-564 g. Face and forehead greyish white grading to greyish on hindcrown and purple on nape; chin and throat cinnamon with a narrow white border between the chestnut and the very dull purplish green breast; belly pale pink; flanks and undertail-coverts chestnut; rest of plumage bronzy green or golden-green; hindneck, sides of neck and upper mantle purplish red; prominent greyish white band across centre of tail; underwing blackish and dark green; undertail blackish with greyish white band; orbital skin, legs,

On following pages: 269. White-bellied Imperial-pigeon (*Ducula forsteri*); 270. Mindoro Imperial-pigeon (*Ducula mindorensis*); 271. Grey-headed Imperial-pigeon (*Ducula radiata*); 272. Grey-necked Imperial-pigeon (*Ducula carola*); 273. Green Imperial-pigeon (*Ducula aenea*); 274. White-eyed Imperial-pigeon (*Ducula perspicillata*); 275. Blue-tailed Imperial-pigeon (*Ducula concinna*); 276. Pacific Imperial-pigeon (*Ducula pacifica*); 277. Micronesian Imperial-pigeon (*Ducula oceanica*); 278. Polynesian Imperial-pigeon (*Ducula auro-rae*); 279. Nukuhiva Imperial-pigeon (*Ducula galeata*).

and feet red; bill greyish black. Female similar, but has greenish tinge on crown, less clearly defined chestnut patch on throat; sometimes rufous edging to pink belly feathers. Juvenile like female, but has less prominent rufous fringes to belly feathers.

Habitat. Inhabits forest, primarily in the highlands at 400–1500 m; frequents the tops of forest trees. Apparently forms mixed-species flocks for roosting with, e.g., *D. mindorensis* and *Columba vitiensis*.

Food and Feeding. No information available.

Breeding. No information available.

Movements. No information available.

Status and Conservation. Not globally threatened. Very little information on status, but species is generally considered uncommon. Apparently no recent records on Negros and just 11 birds recorded in 4 weeks of fieldwork on Mindoro in 1991; however, locally fairly common in PICOP logging concession, near Bislig (Mindanao). Extensive research required on all aspects of biology and ecology; more information required on population sizes and trends.

Bibliography. Brooks, Dutson, Gabutero & Timmins (1995), Brooks, Dutson, King & Magsalay (1996), Brooks, Evans *et al.* (1992), Delacour & Mayr (1946), Dickinson *et al.* (1991), DuPont (1971), Dutson *et al.* (1992), Evans, Dutson & Brooks (1993), Gonzales (1983), Goodman & Gonzales (1990), Hachisuka (1932), McGregor (1909–1910), Rabor (1977), Rand & Rabor (1960).

269. White-bellied Imperial-pigeon

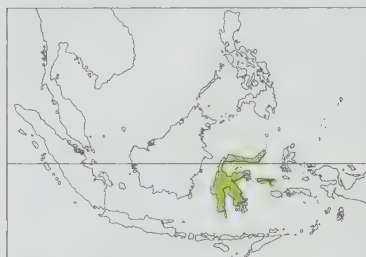
Ducula forsteni

French: Carpophage de Forsten **German:** Weißbauch-Fruchttaube **Spanish:** Dúcula de Forsten
Other common names: (Large) Celebes/Green-and-white Zone-tailed Pigeon/Imperial-pigeon

Taxonomy. *Hemiphaea forsteni* Bonaparte, 1854, Sulawesi.

Forms superspecies with *D. poliocephala*, with which sometimes considered conspecific; also closely related to *D. mindorensis* and *D. radiata*; this species-group may form a link between *Ptilinopus* fruit-doves and other imperial-pigeons. Recently discovered population of Sula Is may represent a distinct subspecies. Monotypic.

Distribution. Sulawesi and Sula Is (Taliabu, Mangole).



Descriptive notes. 42.5–51.5 cm; 510 g. General plumage emerald to golden-green or bronzy green; centre of mantle usually appears purplish and there is a coppery tinge to hindneck; head pale grey becoming white on forehead and throat; lower breast and belly white tinged with pink or cream; undertail-coverts chestnut; broad pale grey band across centre of tail; iris yellow or orange with darker red or orange outer ring; bill black; legs and feet purplish. Female resembles male but with grey parts of plumage slightly darker. Juvenile plumage apparently undescribed.

Habitat. Primary forest and dense secondary

forest in mountains, or in Sula Is along coast; sometimes also in isolated patches of hill forest; generally in lower canopy and middle storey, but often perches above canopy on exposed branches. Recorded at 150–2200 m, with greatest abundance at 800–1600 m.

Food and Feeding. No information available. Forms congregations of up to 30 birds at fruiting trees.

Breeding. No information available.

Movements. No information available.

Status and Conservation. Not globally threatened. Widespread throughout Sulawesi, where described as moderately common and even locally common; common in primary forest of Dumoga-Bone National Park (Minahassa Peninsula). Uncommon in Sula Is, where species was found to occur only as recently as 1988. Biology and ecology virtually unknown; extensive research required.

Bibliography. Andrew (1992), Coates & Bishop (1997), Gibbs (1990), Holmes & Philipps (1996), Rozendaal & Dekker (1989), Stresemann (1941), Sujatnika *et al.* (1995), Watling (1983), White & Bruce (1986), Whitten *et al.* (1987).

270. Mindoro Imperial-pigeon

Ducula mindorensis

French: Carpophage de Mindoro **German:** Mindorofruchttaube **Spanish:** Dúcula de Mindoro
Other common names: Mindoro (Zone-tailed) Pigeon, Great Mindoro Fruit-pigeon, Pink-throated Imperial-pigeon

Taxonomy. *Carpophaga mindorensis* Whitehead, 1896, highlands of Mindoro.

Forms superspecies with *D. radiata*, with which sometimes considered conspecific; also closely related to *D. poliocephala* and *D. forsteni*; this species-group may form a link between *Ptilinopus* fruit-doves and other imperial-pigeons. Monotypic.

Distribution. Mindoro (NC Philippines).



Descriptive notes. 47 cm. Head, neck, breast and underparts light blue-grey washed with rufous on vent and undertail-coverts; dark greyish black ring around eye ends in a short post-ocular stripe; lower face and throat pale pink; forehead silver grey, sometimes tinged pink; hindneck dark grey becoming blackish purple on upper mantle; upperparts predominantly emerald green; mantle and innerwing-coverts purple and bronzy red; primaries and tail greenish black to bluish black; prominent grey band across centre of tail; iris bright yellow with red outer ring; orbital skin dark red; bill black; legs and feet reddish pink. Female

said to differ in having yellow and brown iris with yellow-orange orbital skin. Juvenile plumage apparently undescribed.

Habitat. Forests above 1000 m. Has been observed forming mixed-species roosting flocks with *D. poliocephala* and *Columba vitiensis*.

Food and Feeding. Little information. One record of feeding on large purple fruits. Usually recorded singly or in pairs, occasionally small groups of up to 4 birds.

Breeding. No information available.

Movements. No information available.

Status and Conservation. ENDANGERED. CITES I. Apparently always scarce, with observations in 1890's and 1950's already suggesting its scarcity. Observations in 1991 suggested that the species is distributed throughout the mountains of Mindoro where forest remains in the 700–2000 m altitude range, but apparently occurs mostly in lowest part of this range, with only two records from above 1000 m. Not uncommon at Mt Ilong. Recently reported from lowlands in NE of island, but this record appears surprising, given the lack of forest in this region, and requires confirmation. This is a large species, targeted by hunters; logging continues to reduce its habitat. Survey work and research urgently required in order to establish current status and conservation requirements.

Bibliography. Brooks, Dutson *et al.* (1995), Collar & Andrew (1988), Collar *et al.* (1994), Delacour & Mayr (1946), Dickinson *et al.* (1991), DuPont (1971), Dutson *et al.* (1992), Erritzoe (1993), Evans, Dutson & Brooks (1993), McGregor (1909–1910), Ripley & Rabor (1958).

271. Grey-headed Imperial-pigeon

Ducula radiata

French: Carpophage à queue barrée **Spanish:** Dúcula Colibarrada
German: Rotflanken-Fruchttaube

Other common names: Celebes/Grey-headed Zone-tailed Pigeon/Imperial-pigeon, Grey-banded Imperial-pigeon, Celebes Band-tailed Fruit-pigeon

Taxonomy. *Columba radiata* Quoy and Gaimard, 1830, Menado, Sulawesi.

Forms superspecies with *D. mindorensis*, with which sometimes considered conspecific; also closely related to *D. poliocephala* and *D. forsteni*; this species-group may form a link between *Ptilinopus* fruit-doves and other imperial-pigeons. Monotypic.

Distribution. Sulawesi.



Descriptive notes. 36–39 cm; 295 g. Male has head, sides of neck, breast and underparts pale grey, mixed with dull chestnut on flanks and belly; undertail-coverts chestnut; blackish purple patch on hindneck; mantle, back and wings iridescent reddish purple, mixed with bronzy green on back and tail (in some lights the upperparts appear emerald green with no reddish tinge); prominent grey band across centre of tail, narrowly edged black; underside of tail blackish with grey central band; underwings dark grey; iris orange, sometimes with red outer ring; bill black with dark grey cere; legs and feet purple or purplish red. Female

has grey areas darker, with little purple or reddish seen except on upper mantle; back and wings emerald green with bluish green or bronzy intermixed.

Habitat. Montane forest at 200–2400 m, both within dense forest and at edge; most numerous at c. 1600–2200 m.

Food and Feeding. Forages in middle storey and lower canopy; feeds in flocks. No information on diet.

Breeding. Records of eggs in Dec and Mar. Nests reported to be placed sometimes (perhaps usually) in hollows or on sheltered ledges on cliffs and rocky outcrops in mountain forests; one record of nesting on ground. Lays 1 egg.

Movements. Appears to be somewhat nomadic, performing altitudinal movements either locally or seasonally, or perhaps both, when descends to lowlands to visit fruiting trees.

Status and Conservation. Not globally threatened. Reported to be widespread but generally uncommon, although can be common locally or perhaps seasonally. Found to be uncommon in Dumoga-Bone National Park in 1980's, but may have been under-recorded. Research required, especially to establish movement patterns and their significance.

Bibliography. Andrew (1992), Andrew & Holmes (1990), Coates & Bishop (1997), Gibbs (1990), Holmes & Philipps (1996), Rozendaal & Dekker (1989), Stresemann (1941), Sujatnika *et al.* (1995), Watling (1983), White & Bruce (1986), Whitten *et al.* (1987).

272. Grey-necked Imperial-pigeon

Ducula carola

French: Carpophage charlotte **German:** Hufeisen-Fruchttaube **Spanish:** Dúcula de Carlota
Other common names: Spotted/Grey-breasted/Grey-necked Fruit-pigeon/Imperial-pigeon

Taxonomy. *Ptilocolpa carola* Bonaparte, 1854, Philippine Islands.

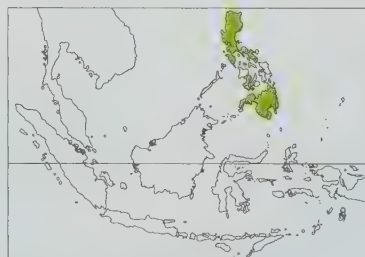
A distinctive species of uncertain affinities, perhaps most closely allied to the *D. poliocephala* species-group. Three subspecies recognized.

Subspecies and Distribution.

D. c. carola (Bonaparte, 1854) - Luzon, Mindoro and Sibuyan (N Philippines).

D. c. nigrorum (Whitehead, 1897) - Negros and Siquijor (EC Philippines).

D. c. mindanensis (Ogilvie-Grant, 1905) - Mindanao (SE Philippines).



Descriptive notes. 33 cm. Head, neck and breast silvery grey to pale blue-grey, with a crescent-shaped white band across the breast; mantle, back and wing-coverts silver grey or mauve-grey spotted black; outerwing-coverts, secondaries and rump grey-mauve tinged iridescent green; primaries, secondaries and tail greenish black; longer uppertail-coverts iridescent green; lower underparts dark chestnut, separated from grey breast by a narrow black band; flanks and underwings greyish; iris white; bill pink or pinkish red, white at tip; legs and feet pink or pinkish red. Female has head and neck darker grey with less silver, and

white crescent on breast lacking; underparts greyish mauve tinged rufous; undertail-coverts cinnamon; upperparts purplish and iridescent green, brightest on rump; metallic tones richer than in male. Juvenile has breast and belly chestnut. Race *nigrorum* has lower breast black in male, female

dark on breast with more chestnut on belly; *mindanensis* similar to previous race, but chin, throat and upper breast almost white and lower breast slaty black, wing-coverts fringed with richer reddish chestnut.

Habitat. Forest, including forest edge, from lowlands up to 2000 m.

Food and Feeding. Little information. Reported to feed on large fruits and berries. Sometimes congregates in large numbers at fruiting trees.

Breeding. Very little known. One nest found in May on Mindoro, in a hollow in a perpendicular cliff, c. 4 m up; it was a scant platform of twigs, containing one white egg.

Movements. Little information. Reported to fly regularly over mountain ridges in flocks.

Status and Conservation. **VULNERABLE.** All races appear to be rare, with populations in decline due to continuing habitat destruction and hunting. During fieldwork in 1991, species could not be found on either Negros or Mindoro, although it has recently been reported from the W side of the latter; on Luzon, uncommon but regularly recorded at Angat Water Catchment Area, near Manila; on Mindanao, frequently heard at PICOP logging concession, near Bislig. Surveys required in order to establish current status.

Bibliography. Alonzo-Pasicolan (1992), Brooks *et al.* (1992), Collar *et al.* (1994), Danielsen *et al.* (1994), Delacour & Mayr (1946), Dickinson *et al.* (1991), DuPont (1971), Dutton *et al.* (1992), Evans, Dutton & Brooks (1993), Evans, Magsalay *et al.* (1993), Hachisuka (1932), Lambert (1993b), McGregor (1909-1910), Poulsen (1995), Rand & Rabor (1960), Ripley & Rabor (1958).

273. Green Imperial-pigeon

Ducula aenea

French: Carpophage pauline **German:** Bronzefruchtaube **Spanish:** Dúcula Verde
Other common names: Chestnut-naped Imperial-pigeon (*paulina*); Enggano Imperial-pigeon (*oenothorax*)

Taxonomy. *Columba aenea* Linnaeus, 1766, Moluccas; error = Manila.

Forms a species-group with *D. perspicillata* and *D. concinna*. Races *oenothorax* and *paulina* sometimes considered two separate species. Racial variation not altogether clear; proposed race *andamanica* (Andaman Is) included in *sylvatica*; *polia* (Lesser Sundas) included in nominate; *intermedia* (Talaud Is), *pallidinucha* (SE Sulawesi and offshore islands), *pulchella* (Togian Is) and *sulana* (Banggai and Sula Is) included in *paulina*; *chalybura* is synonym of nominate; further analysis is likely to reduce further still the number of races accepted. Thirteen subspecies currently recognized.

Subspecies and Distribution.

D. a. sylvatica (Tickell, 1833) - N India through Nepal to S Myanmar (C Tenasserim) and Andaman Is, N Thailand, Laos, Vietnam and Cambodia.

D. a. pusilla (Blyth, 1849) - S India and Sri Lanka.

D. a. nicobarica (Pelzeln, 1865) - Nicobar Is.

D. a. mista (Oberholser, 1912) - Simeulue (off NW Sumatra).

D. a. babiensis (Richmond, 1912) - Tapah Is of Babi and Lasia (off S Simeulue).

D. a. consobrina (Salvadori, 1887) - Nias (off CW Sumatra).

D. a. vicina (Riley, 1927) - Batu Is and Mentawai Is (off CW Sumatra).

D. a. oenothorax (Salvadori, 1892) - Enggano (off SW Sumatra).

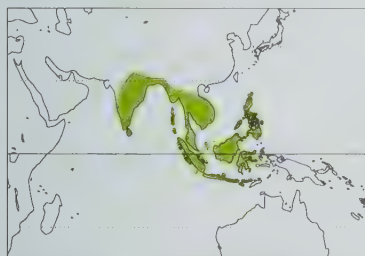
D. a. aenea (Linnaeus, 1766) - Malay Peninsula from Tenasserim and S Thailand through Sumatra (including Riau Archipelago, Bangka), Borneo (including Anambas, Natuna, Tambelan Is) and Philippines (all main islands except Palawan) to Java and Lesser Sundas (Lombok, Sumbawa, Sumba, Flores, Pantar, Alor).

D. a. palawanensis (A. W. H. Blasius, 1888) - Banggi (off NE Borneo) through Balabac, Palawan and Dumarani to Linapacan, Culion, Calauit and Busuanga (W Philippines).

D. a. fugaenis (Hachisuka, 1930) - Calayan, Fuga and Caniguin Norte (N Philippines).

D. a. nuchalis (Cabanis, 1882) - N Luzon (N Philippines).

D. a. paulina Bonaparte, 1854 - Talaud and Sangihe Is to Sulawesi (and associated islands) and Togian, Banggai and Sula Is.



Descriptive notes. 40-47 cm, 365-644 g. Head, neck, upper mantle, breast and belly pale grey-pink; some white feathers around eye and at base of bill; upperparts iridescent green, with bluish or bronzy tinge; primaries, outer secondaries and tail feathers grey with slight green or blackish green iridescence; undertail-coverts dark chestnut; iris dark red; bill bluish grey; feet red. Sexes alike, but female often slightly duller. Juvenile slightly duller than adult, with less pronounced pink tinge to head and underparts. Races vary extensively in coloration, the most different being: *nicobarica* has dark, almost blackish iridescent green upperparts, and

grey head, neck and underparts without any pink tinge; *nuchalis* has purplish maroon nape patch, and much more heavily bronzed upperparts; *paulina* has a prominent rusty nape patch and rich green upperparts; *oenothorax* is brightly iridescent above, with grey head and neck, pinkish breast and greenish undertail-coverts.

Habitat. Forests, including both primary and secondary forests; also mangroves, open country with scattered trees and second growth. Mainly found in lowlands; in India reported up to c. 300 m, occasionally to 600 m; in Greater and Lesser Sundas reported to 1000 m.

Food and Feeding. Frugivorous, taking a large variety of fruits and berries; wild figs (*Ficus*) and nutmeg (*Myristica*) are favourite foods; other recorded items include the buds of mangroves (*Avicennia*). Often seen singly, in pairs, or small groups, feeding in the canopy.

Breeding. In India Feb-Jun (peak Apr-May); Sumatra in most months; W Java in Jan; in Lesser Sundas Apr-Jul; and nests with eggs on Negros (Philippines) in Mar-Apr. Nest is a slight platform of twigs, placed in a leafy sapling or understorey tree, usually less than 10 m up; both sexes take part in nest building. Usually 1 white, slightly glossy egg, rarely 2; incubation by both sexes, period unknown.

Movements. Apparently resident. In S Vietnam, where occurs mainly in mountains, only descends to lowland areas when these provide a rich food source. In Sri Lanka, reported to have regular roosting trees, sometimes located several kilometres from feeding areas. Flight swift and powerful, usually well above the canopy.

Status and Conservation. Not globally threatened. Widespread and remains common in much of its extensive range, e.g. in many parts of Sri Lanka, Greater Sundas, Philippines and N Sulawesi, and also locally on Simeulue; generally the commonest *Ducula* within its Wallacean range from Sulawesi and Banggai and Sula Is to Lesser Sundas. Apparently rare in other areas, e.g. on Bohol and Negros, EC Philippines.

Bibliography. Abdulali (1978), Ali (1996), Ali & Ripley (1981), Alonzo-Pasicolan (1992), Baker (1913), Bhattacharyya (1990), Coates & Bishop (1997), Deignan (1945), Dickinson *et al.* (1991), Hellebrekers & Hoogerwerf (1967), Het *et al.* (1993), Irvén (1994), Kirkpatrick (1960), Lekagul & Round (1991), MacKinnon & Philipps (1993), Madoc (1976), Majumdar *et al.* (1992), van Marle & Voous (1988), Mayr (1944b), Medway & Wells (1976), Parkes (1965a), Phillips (1978), Rabor (1977), Rand & Rabor (1960), Round (1988), Rutgers & Norris (1970), Smythies (1981, 1986), Stepanyan (1995), Stresemann (1941), Thiollay (1995), Tikader (1984), White & Bruce (1986), Whitten *et al.* (1987), Yang Lan *et al.* (1995), Zhou Yuyuan (1955).

274. White-eyed Imperial-pigeon

Ducula perspicillata

French: Carpophage à lunettes **German:** Brillenfruchtaube **Spanish:** Dúcula de Anteojos
Other common names: White-spectacled/Spectacled Imperial-pigeon

Taxonomy. *Columba perspicillata* Temminck, 1824, Halmahera.

Forms a species-group with *D. aenea* and *D. concinna*. Two subspecies recognized.

Subspecies and Distribution.

D. p. perspicillata (Temminck, 1824) - N, W & SW Moluccas (Morotai, Loleba Besar, Halmahera, Widi, Damar, Ternate, Tidore, Moti, Kayoa, Kasiruta, Bacan, Obi, Bisa, Buru) and W Papuan Is (Kofiau).

D. p. neglecta (Schlegel, 1866) - S Moluccas (Boano, Seram, Ambon and Saparua).



Descriptive notes. 42 cm. Head dark bluish grey with conspicuous white eye-ring and white band around base of bill; dark grey head grades to pale grey on breast and even paler pinkish grey on belly; nape dark grey suffused green, becoming iridescent blue-green or bronzy green on hindneck, mantle, back and wing-coverts; outer secondaries, primaries and rectrices dark greenish blue; undertail-coverts pinkish grey; iris dark brown; bill greyish blue with reddish base; legs and feet purplish red. Sexes alike. Juvenile slightly duller than adult. Race *neglecta* paler, with head light grey, iridescence on upperparts golden-green and sil-

very bloom to remiges.

Habitat. Prefers primary forests, primarily in the lowlands; also occurs in tall secondary forest, wooded cultivation, mangroves and gardens; scarce in lower montane zone, though recorded up to 800 m on Seram, to 850 m on Halmahera, and to 1400 m on Buru.

Food and Feeding. Frugivorous; feeds on large fruits in the canopy. No further information available.

Breeding. Little information; breeding reported in Feb-Mar on Buru.

Movements. No information.

Status and Conservation. Not globally threatened. Status not well known on most islands, but considered generally common throughout range. Common to abundant in Manusela National Park, C Seram; not uncommon in forest and at forest edge up to at least 300 m on Halmahera.

Bibliography. Andrew (1992), Bishop (1992), Bowler & Taylor (1989), Coates & Bishop (1997), Gibbs (1990), Hartert (1903a), Heinrich (1903), Jepson (1993), Lambert (1994b), Lambert & Young (1989), Linsley (1995), Marsden *et al.* (1997), Stresemann (1914), Sujatnika *et al.* (1995), White & Bruce (1986).

275. Blue-tailed Imperial-pigeon

Ducula concinna

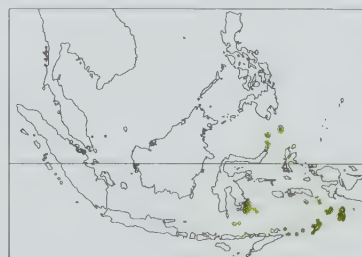
French: Carpophage à queue bleue **German:** Blauschwanz-Fruchtaube **Spanish:** Dúcula Coliazul

Other common names: Collared(!)/Elegant/Yellow-eyed/Gold-eyed Imperial-pigeon

Taxonomy. *Carpophaga concinna* Wallace, 1865, Watubela Island, south-east Moluccas.

Forms a species-group with *D. aenea* and *D. perspicillata*. Several subspecies have been described, but differences appear minor and perhaps clinal, though not well understood at present. Monotypic.

Distribution. Small islands of Wallacea and off NW New Guinea: Talaud and Sangihe Is, islands off S Sulawesi, S Moluccas (including Banda, Manuk and Kai Is) and E Lesser Sundas (Romang to Tanimbar Is) to Aru Is and islands off Bomberai Peninsula (W New Guinea); possibly also Buru (S Moluccas), but only 1 record, presumed to be of a vagrant. A record from Seram (S Moluccas) is now thought to be based on a misidentification of *D. rosacea*.



Descriptive notes. 43 cm. Head, neck and upper mantle pale silvery grey with delicate pink tinge on hindercrown and nape and narrow white ring of feathers at base of bill; rest of upperparts mostly iridescent dark green, mixed with dark blue and with bronzy sheen in some lights; upperside of remiges and tail dark iridescent purplish blue (often appearing black); underparts mostly pale silvery grey, as head and neck but with faint pink tinge; undertail-coverts red-brown; undertail black; underwing entirely black, contrasting with pale grey underbody in flight; bill black or blue-grey; iris golden-yellow; legs and feet pink-red to crimson red.

Sexes similar, but female said to be somewhat darker on grey and pink parts. Juvenile apparently similar to adult but duller.

Habitat. Primary and secondary forest, as well as forest edge and cultivation with trees; mainly in lowlands, but up to at least 850 m. Apparently found only on small islands throughout its range; only 1 record from Buru, presumably a vagrant, reported population of Manusela National Park, Seram, is now thought to be based on misidentification.

Food and Feeding. Frugivorous; known to feed on young coconut fruits. Apparently no further data from normal range, but a vagrant in Darwin (NC Australia) fed in banyan fig and palm trees. Typically in flocks of as many as 40 birds.

Breeding. No information available.

Movements. Poorly known. Commonly occurs in flocks and thought to move between small islands in search of food. One vagrant individual reached Australia (Darwin, Northern Territory),

perhaps having moved S with migrating *D. spilorrhoa*; single record from S Buru is also thought to refer to a vagrant.

Status and Conservation. Not globally threatened. Apparently reliant on remnant forest patches. Little precise information on status, but species still regular on Sangihe at 200–800 m; also frequent in Talaud Is, where common on Karakelong up to 300 m, but no recent records from Salebabu, where villagers report decline in numbers due to habitat loss and hunting. Locally very common, e.g. on Tanhajampea and Kalaotoa (Flores Sea), and in Kai and Tanimbar Is.

Bibliography. Andrew (1992), Beehler *et al.* (1986), Bishop (1992), Bowler & Taylor (1989), Coates & Bishop (1997), Diamond, J.M. (1985), Diamond, J.M. & Bishop (1994), Dutton (1995), Goodchild (1905), Higgins & Davies (1996), Meise (1930), Rand & Gilliard (1967), Riley (1997), Rutgers & Norris (1970), Salomonsen (1934), Schodde & Mathews (1977), Sujatnika *et al.* (1995), White & Bruce (1986), Wright *et al.* (1995).

276. Pacific Imperial-pigeon

Ducula pacifica

French: Carpophage pacifique **German:** Tongafruchttaube **Spanish:** Dúcula del Pacífico
Other common names: Pacific Pigeon

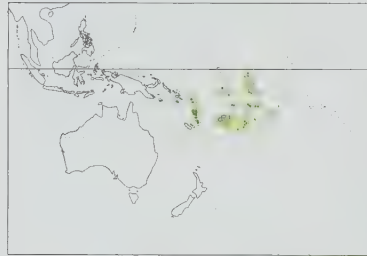
Taxonomy. *Columba pacifica* J. F. Gmelin, 1789, Tonga.

Sometimes considered to include *D. aurorae* as a subspecies; these two form a superspecies, along with *D. oceanica* and perhaps *D. galeata*. Two subspecies currently recognized.

Subspecies and Distribution.

D. p. sejuncta Amadon, 1943 - islands off NC New Guinea (Seleo, Tarawai) and Ninigo Group and Hermit Is (W Bismarck Archipelago).

D. p. pacifica (J. F. Gmelin, 1789) - Louisiade Archipelago through NE & SE Solomons (Ndai, Rennell) and nearby Stewart Is to Santa Cruz Is and Vanuatu, and E to Tuvalu, Phoenix Is, Tokelau, Fiji (smaller islands), Wallis and Futuna, Samoa, Tonga, Niue and Cook Is.



Descriptive notes. 36–41 cm, 370–420 g. Head and neck light grey, breast grey with pinkish cast; back, tail and wings blackish green; wing-lining slate-grey; undertail-coverts cinnamon brown; bill black with prominent knob at base of upper mandible; legs brownish-red; iris red. Female slightly smaller. Juvenile similar but lacks knob on bill; duller, without pink on breast; iris brownish. Race *sejuncta* smaller, with more rounded wings, and paler grey on head, neck and underparts.

Habitat. On larger islands (e.g. in Samoa), found in montane rain forests up to at least 1000 m; on smaller islands, inhabits dry littoral forest and scrub, and is rarely found above 450 m.

Food and Feeding. Almost entirely frugivorous, although young leaves and flowers are eaten on occasion. Studies on Tutuila (American Samoa) confirmed feeding on the fruits of 22 species of trees, shrubs, and vines, particularly in the families Annonaceae (*Cananga*), Burseraceae (*Canarium*), Meliaceae (*Dysoxylum*), Moraceae (*Ficus*), Myristicaceae (*Myristica*) and Sapotaceae (*Planchonella*); many of these fruits are large-seeded drupes (e.g. *Canarium*, *Myristica*, *Planchonella*) that are too large for smaller fruit-doves to eat. Feeds on fruit contained in tough capsules (e.g. *Myristica*, *Dysoxylum*) by waiting for capsules to split and then reaching inside to extract the seed. The young leaves of 3 species of Fabaceae and one species of Ebenaceae were eaten, as were flower buds of 1 species of Sterculiaceae. Almost always feeds perched, often in canopy, sometimes hanging upside-down or stretching out far to reach fruits on twigs too small to bear its weight; occasionally feeds on otherwise inaccessible vine fruits by crash-landing into the vine and seizing the fruit before dropping away; has been reported to feed on the ground. May form considerable flocks in favourite fruiting trees.

Breeding. On Tutuila, nesting Jan–Sept, with most records from May–Aug. On 'Eua (S Tonga), recently fledged juveniles commonest in Jan–Feb. Nest is well concealed, placed high in forest canopy; of 3 nests on Tutuila, 2 were 20–25 m up, but the other was only 8 m up in a small tree, though this was growing from a vertical cliff, affording complete security; nest loosely constructed of twigs, and unlined. Lays 1 white egg, perhaps occasionally 2; both adults incubate egg and feed nestling; at one nest with a large chick, one adult remained perched in nest-tree almost continuously, without brooding.

Movements. Has been reported to move between islands seasonally to exploit fruit crops. Also found on small, isolated islands, where apparently sedentary. Often seen flying long distances at considerable height, suggesting perhaps a large foraging range.

Status and Conservation. Not globally threatened. Populations on many islands have declined significantly due to hunting and habitat loss. In Vanuatu, where species remains fairly common only in remote forest, and populations have declined markedly on several islands due to forest clearance for plantations and gardens; species is now afforded formal protection in Vanuatu, except in the permitted hunting season (Apr–Jun), but it is apparently still widely poached outside this period. Hunted for food throughout its range. Before European contact, Tongans and Samoans built elaborate traps on massive stone platforms to catch pigeons, an activity of great cultural significance. Habitat loss is probably especially serious on smaller islands where the pigeons inhabit the littoral zone.

Bibliography. Amadon (1943), Amerson *et al.* (1982), Armstrong (1932), Banks (1984), Beckon (1980), Beehler *et al.* (1986), Beichle (1989, 1991b), Beichle & Maelzer (1985), Bregulla (1992), Cain & Galbraith (1956), Clapp & Sibley (1966), Clunie (1984), Coates (1985), Engbring & Ramsey (1989), Gill (1996), Hannecart & Létocart (1983), Holyoak (1980), Holyoak & Thibault (1978), Kinghorn (1925), Mayr (1945b), Muse & Muse (1982), Pratt *et al.* (1987), Rand & Gilliard (1967), Reed (1980b), Rinke (1986a, 1987), Watling (1982a), Whitmee (1875), Yaldwyn (1952).

277. Micronesian Imperial-pigeon

Ducula oceanica

French: Carpophage de Micronésie **German:** Karolinenfruchttaube **Spanish:** Dúcula de Micronesia
Other common names: Micronesian Pigeon

Taxonomy. *Columba oceanica* Lesson & Garnot, 1826, Kosrae, Caroline Islands.

Forms a superspecies with *D. pacifica*, *D. aurorae* and perhaps *D. galeata*. Most races based mainly on rather slight differences in size. Five subspecies currently recognized.

Subspecies and Distribution.

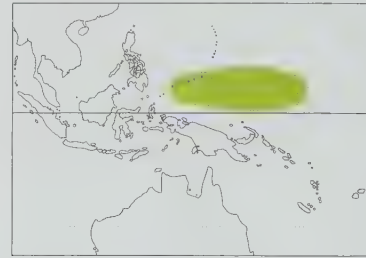
D. o. monacha (Momiya, 1922) - Palau Is; also Yap (W Caroline Is), where possibly introduced.

D. o. teraikai (Momiya, 1922) - Chuuk (C Caroline Is).

D. o. townsendi (Wetmore, 1919) - Pohnpei (E Caroline Is).

D. o. oceanica (Lesson & Garnot, 1826) - Kosrae (E Caroline Is).

D. o. ratakensis (Takatsukasa & Yamashina, 1932) - Wotje, Ailinglaplap, Arno and Jaluit (Marshall Is).



Descriptive notes. 41–46 cm; 340–406 g. Upperparts blackish with a greenish blue sheen; head, neck and breast grey, and the abdomen and undertail-coverts rufous brown; adults have an enlarged horn-like black cere; legs reddish black. Female slightly smaller. Juvenile resembles adult, but paler overall, with darker legs and lacking enlarged cere; very young birds have brownish back plumage and rusty edges to the wing feathers. Races separated mainly on size; race *monacha* has paler grey head, neck and breast.

Habitat. Appears to favour interior montane forest, although this may be due in part to hunting pressure in more accessible habitats. Sometimes occurs in mangroves, e.g. Pohnpei and Yap; in savanna, e.g. Yap; and in littoral strand vegetation, e.g. Arno, Wotje and Ant Atoll (Pohnpei); on Yap, occasionally found in agroforest, although commonest in well developed forests of the interior. In Palau, occurs both on small rock islands and the larger, well forested island of Babelthaup.

Food and Feeding. Frugivorous; feeds on a variety of fruits and large fleshy seeds; on Kosrae and Ant Atoll, feeds on ripe breadfruit; other reported food plants include *Cananga*, *Gmelina*, and *Pinanga*.

Breeding. Thought to occur all year round, but little precise information available. Nest constructed of loose twigs and placed in the fork of a branch in a tall tree. Lays 1 egg.

Movements. Known to fly between islands of large atolls, e.g. Chuuk; also within island groups, e.g. Palau. A strong flier, with deep, heron-like wingbeats.

Status and Conservation. Not globally threatened. Race *teraikai*, on Chuuk, is critically endangered; numbers were estimated to be only 51 individuals, based on 1984 surveys. Race *ratakensis* listed as Indeterminate by IUCN, due to its very restricted range and lack of recent information on status. Populations of *townsendi* on main island of Pohnpei are uncommon to rare, and face strong hunting pressure; a population of this race on Ant Atoll is protected from hunting and persists at a high density. Populations of *oceanica* (Kosrae) and *monacha* (Palau and Yap) appear stable. Hunting pressure is the most immediate threat faced by this species; local hunting laws provide some theoretical protection throughout its range, but there is little effective enforcement. Loss of habitat, especially on densely-populated Chuuk, is also a threat to its long-term survival. Formerly occurred in Kiribati, on Kuria and Aranuka. Species may have been introduced to Yap from Palau some time after mid-19th century.

Bibliography. Amadon (1943), Baker (1951), Brandt (1962), Dahl (1986), Engbring (1992), Engbring *et al.* (1990), Finsch (1881), Fisher (1950), Hay (1986), King (1978/79), Marshall (1949), Mayr (1945b), Momiya (1922), Pérez & Kami (1967), Pratt, Bruner & Berrett (1977, 1987), Pratt, Engbring *et al.* (1980).

278. Polynesian Imperial-pigeon

Ducula aurorae

French: Carpophage de la Société **German:** Aurorafruchttaube **Spanish:** Dúcula de las Sociedad
Other common names: Society Islands/Tahitian/Aurora Pigeon

Taxonomy. *Carpophaga aurorae* Peale, 1848, Makatea (formerly Aurora I), Tuamotu Archipelago. Sometimes considered a subspecies of *D. pacifica*; these two form a superspecies, along with *D. oceanica* and perhaps *D. galeata*. Race *wilkesii* sometimes considered invalid. Two subspecies recognized.

Subspecies and Distribution.

D. a. aurorae (Peale, 1848) - Makatea (Tuamotu Archipelago).

D. a. wilkesii (Peale, 1848) - Tahiti (Society Is).



Descriptive notes. 51 cm. Large, long-tailed pigeon with dark iridescent green and blue back, wings and tail; head, neck and underparts pale silvery grey; undertail-coverts greyish, sometimes tinged rufous; iris red; legs and feet bright red; bill black with enlarged cere. Female slightly smaller. Juvenile much darker; head and neck dark greyish green, underparts dark grey.

Habitat. Dense forests.

Food and Feeding. Frugivorous; feeds on a variety of native and introduced fruits, including guava, wild plantains, figs, *Terminalia* (Combretaceae), and the climbing vine *Frey-*

cinetia (Pandanaeae).

Breeding. No information available.

Movements. No information. Flight slow, with deep wingbeats.

Status and Conservation. VULNERABLE. Very rare, and possibly even extinct on Tahiti, where endemic race *wilkesii* may survive only in the Papenoo and Hitiaa Valleys. Population on Makatea appears to be stable, but is estimated at only 100–500 birds. Species is threatened by hunting and habitat destruction. Formerly occurred on Moorea and perhaps other islands, where the spread of the introduced Pacific Marsh-harrier (*Circus approximans*) may have contributed to its demise; archaeological evidence has revealed that, in more distant past, species was apparently widespread in E Polynesia, from Cook Is to Henderson I (Pitcairn Group).

Bibliography. Collar & Andrew (1988), Collar *et al.* (1994), Dahl (1986), Hay (1986), Holyoak (1974b), Holyoak & Thibault (1984), King (1978/79), Monnet, Thibault & Varney (1993), Pratt *et al.* (1987), Seitre, J. & Seitre (1991), Seitre, R. & Seitre (1992), Steadman (1989a), Thibault (1988), Thibault & Guyot (1987), Thibault & Rives (1988), Wilson (1907).

279. Nukuhiva Imperial-pigeon

Ducula galeata

French: Carpophage des Marquises **Spanish:** Dúcula de las Marquesas
German: Marquesasfruchttaube

Other common names: Marquesan Pigeon

Taxonomy. *Serresius galeatus* Bonaparte, 1855, Nukuhiva, Marquesas Islands. Usually considered to be part of a superspecies with *D. pacifica*, *D. oceanica* and *D. aurorae*. Monotypic.

Distribution. Nukuhiva (Marquesas Is). Formerly more widespread.

Descriptive notes. 55 cm. A large pigeon with a large, long head and long tail; mantle, back, rump and wing-coverts glossy dark green; head, neck and underparts dark grey; undertail-coverts chestnut; iris white; legs and feet dark red; cere and bill black, broad and flat, extending more than halfway to the bill-tip and surmounted by white feathers. Female very slightly smaller and duller. Juvenile dull green above, brownish grey below, with feathers of neck and underparts tinged rufous, and of a very loose "woolly" texture; this plumage is soon moulted into subadult plumage, in which grey areas are darker and duller than in adult.

Habitat. Inhabits remote forested valleys above 700 m. Roosts on tall trees close to cliffs.

Food and Feeding. Frugivorous; favourite foods include guavas and the large almond-like fruit of *Terminalia catappa* (Combretaceae), both of which are swallowed whole; interestingly, both of these plants are modern introductions to Marquesas.

Breeding. Nests with nestlings reported in Oct and May. Nests described by Marquesans as being substantial (for a pigeon), built of sticks and placed in leafy trees. Lays 1 very pale creamy brown egg.



Movements. No movements known. Often soars over mountain ridges in strong winds; strong flier, with deep, powerful and rather slow wingbeats.

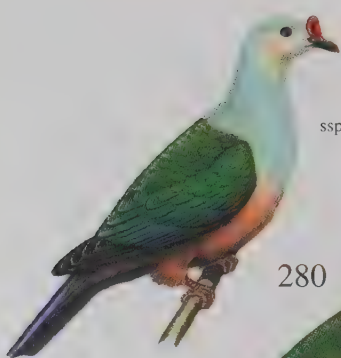
Status and Conservation. CRITICALLY ENDANGERED. Confined to narrow valleys at W end of Nukuhiva; total population estimated at 150-300 birds in 1993. Hunting is the most important factor in the decline of this very large pigeon, but habitat destruction caused by introduced pigs, cattle and goats has also played an important role. Archaeological remains of the species have been found across SE Polynesia, from Cook Is (Mangaia) through Soci-

ety Is to Marquesas, and even Henderson I (Pitcairn Group); apparently exterminated from most of its range before arrival of Europeans.

Bibliography. Collar & Andrew (1988), Collar *et al.* (1994), Dahl (1986), Hay (1986), Holyoak (1975), Holyoak & Thibault (1984), King (1978/79), Pratt *et al.* (1987), Seitre, J. & Seitre (1991), Seitre, R. & Seitre (1992), Steadman (1989a), Thibault (1988).

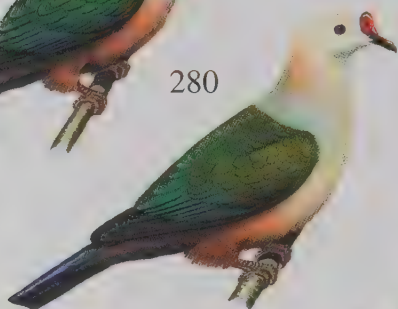
inches 8
cm 21

PLATE 25



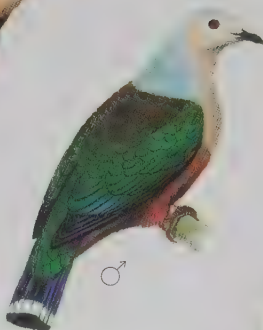
280

ssp *rubricera*

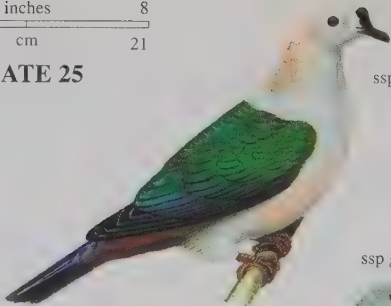


284

♀



♂



ssp *myristicivora*

281

ssp *geelvinkiana*



282

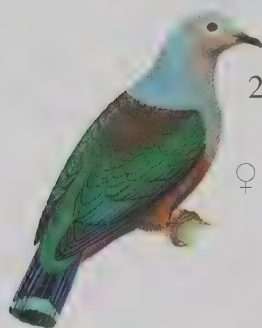


ssp *obiensis*



283

ssp *basilica*



284

♀



ssp *smaragdina*

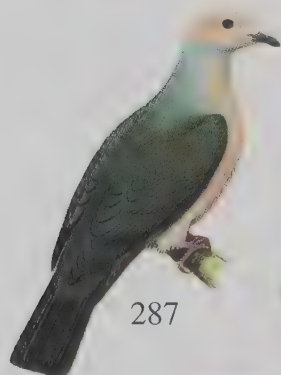
285



ssp *chalconota*



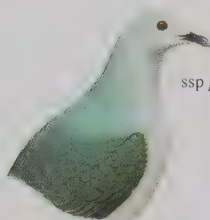
ssp *rhodinolaema*



287



288



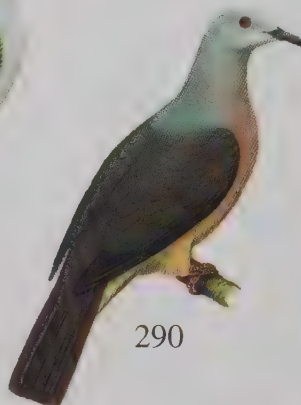
ssp *palmasensis*

289

ssp *pickeringii*



290



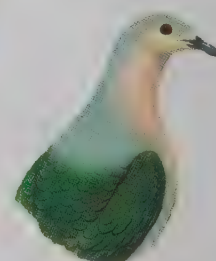
ssp *pinon*



286

ssp *pistrinaria*

ssp *vanwyckii*



ssp *salvadorii*



291



292



293



294



ssp *jobiensis*

280. Red-knobbed Imperial-pigeon

Ducula rubricera

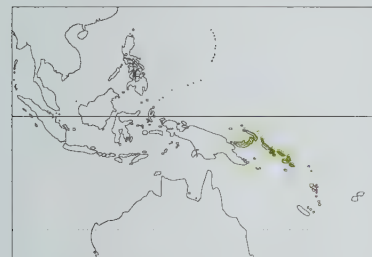
French: Carpophage à cire rouge **German:** Rothöcker-Fruchttaube **Spanish:** Dúcula Cerarroja
Other common names: Red-knobbed Pigeon/Fruit-pigeon

Taxonomy. *Globicera rubricera* Bonaparte, 1854, New Ireland.
Forms a superspecies with *D. myristicivora*. Two subspecies recognized.

Subspecies and Distribution.

D. r. rubricera (Bonaparte, 1854) - Bismarck Archipelago, from New Hanover, New Ireland and Tabar, Lihir, Tanga and Feni Is, through Watom and Duke of York to New Britain, Lolobau, Sakar and Umboi.

D. r. rufigula (Salvadori, 1878) - Solomon Is (except Rennell).



Descriptive notes. 38-45 cm; 628-722 g. Head, nape, and upper breast pale mauve-pink shading through darker pink on lower breast to chestnut on belly, flanks and undertail-coverts; hindneck pale silvery grey; narrow white band around base of bill and eye; mantle, rump and wing-coverts brilliant iridescent emerald, bronzy or golden green; secondaries and tail feathers dark glossy green and blackish blue; primaries blackish blue; underwing dull grey; iris dark red; bill dark grey; enlarged knob-like cere cherry red, yellow in some individuals; legs purplish red. Sexes alike, but female rarely has bronzy iridescence on mantle. Juvenile resembles adult

but lacks enlarged red cere. Race *rufigula* has pink on head confined to cheeks and throat, with crown, neck and breast pale grey; lower breast is darker pink and underparts deeper chestnut.

Habitat. Primary forest and second growth; also fruiting trees in partially cleared areas. Found from sea-level up to 300 m on Bougainville, to 700 m on New Ireland, to 1000 m on New Britain and up to 1100 m on the larger Solomon Is.

Food and Feeding. Frugivorous, taking a variety of fruits and berries. Feeds in the canopy; usually seen alone or in pairs, but flocks of up to 34 are recorded.

Breeding. Little information. Large numbers were reported to be nesting in low shrubs in C Solomons in Feb; birds in breeding condition collected on Bougainville Jul-Sept. Lays 1 egg.

Movements. No information on movements or home range. Often seen flying above the canopy; flies strongly.

Status and Conservation. Not globally threatened. Very little information available, but species reported to be common to abundant in lowland and hill forests. Appears to be at least partly adaptable to disturbed habitats. Research required.

Bibliography. Blaber (1990), Cain & Galbraith (1956), Coates (1985), Diamond (1975c), Eastwood (1995c), French (1957), Hadden (1981), Kaestner (1987), Mayr (1945b), Meyer (1934), Rutgers & Norris (1970), Schodde (1977), Sibley (1951), Webb (1992, 1997).

281. Spice Imperial-pigeon

Ducula myristicivora

French: Carpophage cuivré **German:** Schwarzhöcker-Fruchttaube **Spanish:** Dúcula Ceranegra
Other common names: Black-knobbed Imperial-pigeon, Nutmeg-eating Fruit-pigeon

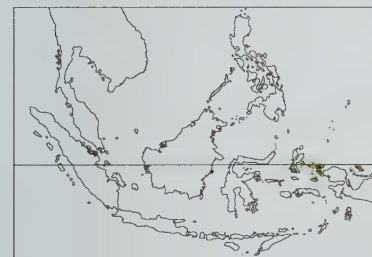
Taxonomy. *Columba myristicivora* Scopoli, 1786, New Guinea.

Forms a superspecies with *D. rubricera*; a close relationship with *D. concinna* has also been suggested. Two subspecies recognized.

Subspecies and Distribution.

D. m. myristicivora (Scopoli, 1786) - Widi Is (off SE Halmahera) and W Papuan Is.

D. m. geelvinkiana (Schlegel, 1873) - Meos Num, Numfor and Biak, in Geelvink Bay.



Descriptive notes. 41-43 cm; 540 g. Head, neck and breast pale silvery grey tinged with pink; a creamy white band at base of bill; hindcrown and nape pale pink; lower breast and belly pale mauve or greyish pink, blending into grey of upper breast and darker greyish pink of flanks; mantle, back, rump and wing-coverts iridescent emerald green, with blue or bronzy sheen; primaries, secondaries and rectrices blackish green to blackish blue; iris brown; bill and enlarged knob-like cere black; legs dark red. Sexes alike. Juvenile lacks enlarged cere; undertail-coverts paler; tail greener. Race *geelvinkiana* lacks pink on crown and nape,

which are same grey as rest of head; pink and grey areas of the plumage are slightly darker; black knob-like cere lacking.

Habitat. Wooded areas including primary, secondary and logged forest; also mangroves. Found mainly on small islands.

Food and Feeding. No information available.

Breeding. No information available.

Movements. Occasionally wanders long distances over water, turning up as a vagrant on adjacent mainland.

Status and Conservation. Not globally threatened. Common on islands of Geelvink Bay, but scarce and local in W Papuan Is, especially the larger islands. Only a single old record from Widi Is; current status unknown, and requires verification. Research required.

Bibliography. Andrew (1992), Beehler *et al.* (1986), Coates & Bishop (1997), Diamond (1975c), Rand & Gilliard (1967), Ripley (1964), Sujatnika *et al.* (1995), White & Bruce (1986).

282. Purple-tailed Imperial-pigeon

Ducula rufigaster

French: Carpophage à ventre roux **German:** Rostbauch-Fruchttaube **Spanish:** Dúcula Ventrirrufa
Other common names: (Cinnamon) Rufous-bellied/Red-breasted/Purple-tailed Fruit-pigeon, Rufous-breasted Imperial-pigeon

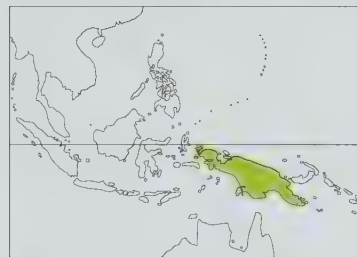
Taxonomy. *Columba rufigaster* Quoy and Gaimard, 1830, Manokwari, New Guinea.

Forms a superspecies with *D. basilica* and *D. finschii*, with both of which present species is sometimes considered conspecific; also closely allied to *D. chalconota*, which some authors include in this superspecies. Two subspecies recognized.

Subspecies and Distribution.

D. r. rufigaster (Quoy & Gaimard, 1830) - W Papuan Is, Vogelkop and S New Guinea E to Orangerie Bay.

D. r. uropygialis Stresemann & Paludan, 1932 - Yapen I and N New Guinea E to Huon Gulf.



Descriptive notes. 33-39 cm; 414-582 g. Rather plump, with shorter wings and tail than many other *Ducula* species; head and foreneck pale mauve-pink shading to rich golden rufous on breast and flanks, to buff on abdomen and whitish on undertail-coverts; hindneck and upper mantle blue-grey; back and wings green with purplish-red iridescence; rump and basal two-thirds of tail purplish-red; apical third of tail grey; underside of tail dull grey with paler grey terminal band. Sexes similar but female tends to be darker on head, with less red iridescence on upperparts. Juvenile resembles adults but is duller. Race *uropygialis* has more

uniform green upperparts, and paler rump and underparts.

Habitat. Forests and sometimes forest edge; primarily in lowlands and foothills up to 600 m, but locally up to 1200 m.

Food and Feeding. Frugivorous; in a study near Brown R, SE Papua New Guinea, the most important food plant families were palms (Arecaceae), nutmegs (Myristicaceae), laurels (Lauraceae), Combretaceae and figs (Moraceae). Typically feeds in the lower part of the canopy; usually solitary.

Breeding. No information available.

Movements. No information. Flies at canopy or lower canopy level; not seen in extended flights above the canopy.

Status and Conservation. Not globally threatened. Poorly known; in New Guinea reported to be fairly common, at least locally, but secretive and not often seen. Research required.

Bibliography. Andrew (1992), Anon. (1994a), Bailey (1992a), Beehler *et al.* (1986), Bellchambers *et al.* (1994), Coates (1985), Diamond (1972a, 1975c), Frith, Crome & Wolfe (1976), Hiaso *et al.* (1994), Mayr & Rand (1937), Ogilvie-Grant (1915), Rand & Gilliard (1967), Ripley (1964), Schmid (1993), Wahlberg (1992).

283. Cinnamon-bellied Imperial-pigeon

Ducula basilica

French: Carpophage des Moluques **German:** Halmaherafruchttaube **Spanish:** Dúcula Moluqueña
Other common names: Pink-headed/Moluccan Rufous-bellied Fruit-pigeon, Rufous-bellied Imperial-pigeon

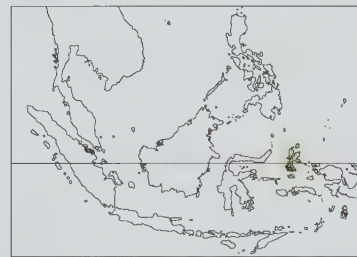
Taxonomy. *Ducula basilica* Bonaparte, 1854, Halmahera.

Forms a superspecies with *D. rufigaster* and *D. finschii*, with both of which present species is sometimes considered conspecific; *D. chalconota* is also placed in this superspecies by some authors. Two subspecies recognized.

Subspecies and Distribution.

D. b. basilica Bonaparte, 1854 - N Moluccas, on Morotai, Halmahera, Kasiruta, Ternate and Bacan.

D. b. obiensis (Hartert, 1898) - C Moluccas on Obi.



Descriptive notes. c. 36-42 cm. Head, sides of neck and breast pale pink; rest of underparts light golden rufous; hindneck pale bluish grey; mantle, back, rump, uppertail-coverts, wing-coverts and secondaries emerald or golden green, with only a small amount of reddish iridescence; primaries and rectrices blackish blue; tail with a broad grey terminal band. Sexes similar, but female slightly duller. Race *obiensis* darker, with nape and sides of neck golden rufous, undertail-coverts deeper cinnamon.

Habitat. Primary and selectively logged forest, as well as wooded cultivation; typically found in middle storey and lower canopy, but also perches on tall emergent trees overlooking surrounding forest. Occurs from sea-level up to 1040 m on Halmahera, up to 1000 m on Bacan, and up to 730 m on Obi; possibly prefers sub-montane forests, and on Halmahera is commonest at 150-600 m.

Food and Feeding. No information available on diet. Readily associates with *D. perspicillata* when feeding.

Breeding. No information available.

Movements. No information available.

Status and Conservation. Not globally threatened. In general, appears to be fairly common to common throughout limited range, but uncommon to rare in coastal areas. Extensive research required.

Bibliography. Andrew (1992), Coates & Bishop (1997), Gibbs (1990), Hartert (1903a), Heinrich (1956), Lambert (1994b), Lambert & Young (1989), Linsley (1995), Sujatnika *et al.* (1995), White & Bruce (1986).

On following pages: 284. Finsch's Imperial-pigeon (*Ducula finschii*); 285. Shining Imperial-pigeon (*Ducula chalconota*); 286. Island Imperial-pigeon (*Ducula pistrinaria*); 287. Pink-headed Imperial-pigeon (*Ducula rosacea*); 288. Christmas Imperial-pigeon (*Ducula whartoni*); 289. Grey Imperial-pigeon (*Ducula pickeringii*); 290. Peale's Imperial-pigeon (*Ducula latrans*); 291. Chestnut-bellied Imperial-pigeon (*Ducula brenchleyi*); 292. Vanuatu Imperial-pigeon (*Ducula bakeri*); 293. New Caledonian Imperial-pigeon (*Ducula goliath*); 294. Pinon's Imperial-pigeon (*Ducula pinon*).

284. Finsch's Imperial-pigeon

Ducula finschii

French: Carpophage de Finsch **German:** Finschfruchttaube **Spanish:** Dúcula de Finsch
Other common names: Finsch's Rufous-bellied Fruit-pigeon

Taxonomy. *Carpophaga finschii* E. P. Ramsay, 1882, no locality; apparently New Britain. Forms a superspecies with *D. rufigaster* and *D. basilica*, with both of which present species is sometimes considered conspecific; *D. chalconota* is also placed in this superspecies by some authors. Monotypic.

Distribution. Bismarck Archipelago, on New Hanover, New Ireland, Watom, New Britain and Umboi.



Descriptive notes. 35-38 cm; 383 g. Head, neck, upper mantle and upper breast pale bluish grey washed pink; white ring around eye; primaries bluish black; tail bluish black with broad white subterminal band and narrower green terminal bar; remainder of upperparts emerald or golden green with bronzy iridescence on mantle; underparts rufous; iris red, bill black, legs red. Sexes rather similar but female tends to be darker grey on head, with grey wash on breast. Juvenile not described.

Habitat. Lowland, foothill and lower montane forest, up to c. 1500 m.

Food and Feeding. Frugivorous; no other information available.

Breeding. No information available.

Movements. No information available.

Status and Conservation. Not globally threatened. Currently considered near-threatened. Species is very little known and apparently rare; reported to be locally frequent in low hills of New Britain and New Hanover. Extensive research required; surveys also needed in order to establish true status.

Bibliography. Beehler *et al.* (1986), Bishop (1987), Coates (1985), Collar *et al.* (1994), Dahl (1986), Diamond (1975c), Eastwood (1995c), Gardner (1987), Rutgers & Norris (1970).

285. Shining Imperial-pigeon

Ducula chalconota

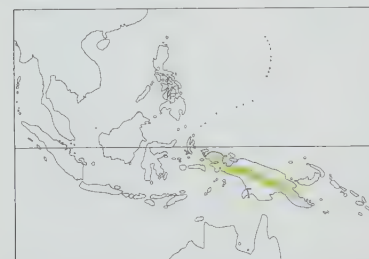
French: Carpophage brillant **German:** Bronzerücken-Fruchttaube **Spanish:** Dúcula Capuchina
Other common names: Red-breasted/Rufescent Imperial-pigeon, Mountain Rufous-bellied/Grey-hooded/Rufous-breasted Fruit-pigeon

Taxonomy. *Carpophaga chalconota* Salvadori, 1874, Arfak Mountains, New Guinea. Closely allied to *D. rufigaster*, *D. basilica* and *D. finschii*, and sometimes considered to belong to that superspecies. Two subspecies recognized.

Subspecies and Distribution.

D. c. chalconota (Salvadori, 1874) - mountains of Vogelkop (NW New Guinea).

D. c. smaragdina Mayr, 1931 - mountains of New Guinea (except Vogelkop), from Weyland to Owen Stanley Mts and mountains of Huon Peninsula.



Descriptive notes. 37-39 cm; 613 g. Head and neck dark blue-grey; throat pinkish brown, shading to dark chestnut on belly and flanks, and pale chestnut on undertail-coverts; upperparts shining bronzy green or emerald-green, with extensive purplish red iridescence on mantle, back and rump; tail bluish black with dark grey terminal band; iris dark red; bill blackish, dark red at base; legs purplish red. Sexes similar, but female often shows less reddish iridescence. Juvenile similar but duller. Race *smaragdina* slightly larger; greener above, largely lacking reddish purple iridescence on mantle, back and rump.

Habitat. Primary montane forests, generally at altitude range of 1400-2500 m, though occasionally down to 1100 m.

Food and Feeding. Frugivorous, feeding on figs and large fruits. Forages in middle and upper storeys of forest; usually solitary or in pairs.

Breeding. Undescribed. Birds in breeding condition were collected on Mt Misim (Morobe Province) in Feb and Mar.

Movements. No information.

Status and Conservation. Not globally threatened. Very little information available on status; species is described as being generally uncommon to rare in its relatively remote habitat. Research and survey work required in order to establish current population size, trends and potential threats, as well as any conservation measures that may be needed.

Bibliography. Andrew (1992), Anon. (1994a), Beehler (1978b), Beehler *et al.* (1986), Coates (1985), Coles (1995), Diamond (1972a, 1975c), Gregory (1995a, 1995b), Mayr & Rand (1937), Rand & Gilliard (1967), Schmid (1993).

286. Island Imperial-pigeon

Ducula pistrinaria

French: Carpophage meunier **German:** Nelkenfruchttaube **Spanish:** Dúcula Insular
Other common names: Grey(!)/Floury/Imperial-pigeon/Fruit-pigeon/Pigeon

Taxonomy. *Ducula pistrinaria* Bonaparte, 1855, St George, Solomon Islands. Forms a superspecies with *D. rosacea*, *D. whartoni* and *D. pickeringii*. Four subspecies recognized.

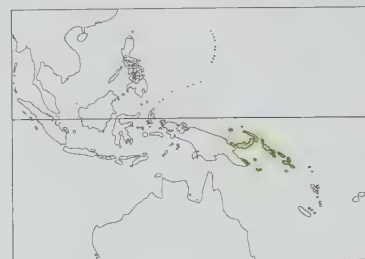
Subspecies and Distribution.

D. p. rhodinolaema (P. L. Selater, 1877) - islands off N coast of New Guinea E to Umboi, also Admiralty Is, St Matthias Group (Mussau and Emira) and New Hanover.

D. p. vanwyckii (Cassin, 1862) - New Britain and Witu Is, and New Ireland (Bismarck Archipelago).

D. p. postrema Hartert, 1926 - D'Entrecasteaux Is (Amphlett Group), Woodlark Group (Egum Atoll, Alcester I) and Louisiade Archipelago (Deboyne Is, Misima, Bramble Haven).

D. p. pistrinaria Bonaparte, 1855 - Lihir, Feni and Green Is SE through Solomon Is.



Descriptive notes. 38-44 cm; 470-500 g. A large, mostly grey forest pigeon; throat and face mauve-pink shading to greyish pink on breast and to pale silvery grey on flanks and tibial feathers; top of head and neck pale bluish grey with creamy white band at base of bill, and ring of same colour around eyes; mantle, back, rump, wing-coverts and inner secondaries dull bronze-green, washed with silvery grey; primaries and outer secondaries blackish with strong silvery tinge; notable contrast in flight between pale underbody and underwing-coverts and blackish flight-feathers; uppertail-coverts iridescent green, brighter than rump; undertail-coverts dark chestnut; rectrices dark blackish green to blackish blue; iris reddish brown; bill dark greyish blue with black tip; legs dark red. Sexes alike. Juvenile duller and slightly paler, with narrow buff edgings to feathers of upperparts and wings. Race *vanwyckii* has pinkish silvery grey on face and throat, silvery grey breast and lower underparts only slightly tinged pink, and upperparts darker, greener and more iridescent; *rhodinolaema* has pink face and throat but otherwise resembles previous race, brighter above; *postrema* is very similar to previous, but slightly smaller.

Habitat. Primary and well developed secondary forests; will visit fruiting trees in partially cleared areas. Usually on small islands and coastal lowlands of larger islands, but reported up to 250 m on New Britain and to 600 m on Bougainville.

Food and Feeding. Frugivorous; no precise details on diet. Feeds in the canopy, often in large, isolated fruiting trees; reported to feed in same trees as *D. brenchleyi* in E. Solomons.

Breeding. Recorded Jul-Sept on Bougainville; reported to occur all year round on Nissan, with definite records in Jun and Aug. Nest is relatively substantial platform of twigs; 1 nest on S Bougainville was 30-35 m up at end of horizontal branch; on Nissan I, nests were located 3-5-17 m up. Lays 1 egg; incubation by both sexes.

Movements. Probably at least partly nomadic, often making long flights over the sea. In New Britain said to roost on offshore islets and fly daily to feed on the mainland. Flight powerful and direct, above the canopy.

Status and Conservation. Not globally threatened. Few details available, but species is reported to be locally common to abundant in many areas, particularly on smaller islands. Research required.

Bibliography. Beehler *et al.* (1986), Blaber (1990), Cain & Galbraith (1956), Coates (1985), Diamond (1975c), Fortune-Hopkins (1988), Gregory (1995c), Hadden (1981), Harding (1982), Howell (1981), Kaestner (1987), Mayr (1945b), Rand & Gilliard (1967), Schodde (1977), Webb (1992, 1997).

287. Pink-headed Imperial-pigeon

Ducula rosacea

French: Carpophage à tête rose **German:** Inselfruchttaube **Spanish:** Dúcula Rosácea
Other common names: Island Imperial-pigeon(!)

Taxonomy. *Columba rosacea* Temminck, 1835, Timor.

Closely related to *D. whartoni*, which is sometimes considered a race of present species; these two form a superspecies with *D. pistrinaria* and *D. pickeringii*. Birds of Java Sea sometimes awarded race *zamydra*, but supposed characters (especially brighter iridescence on upperparts) found in other populations. Monotypic.

Distribution. Islands in Java Sea (Seribu Is, Karimunjawa, Bawean, Maselembu Besar, Arends), Bali Sea (Kangean) and Flores Sea (Tukangbesi, Salayar, Tanahjampea, Kalao, Kalaotao), locally N to Moluccas (Loloda Is, NW Halmahera, Bacan, Tayandu, Kai Is), and through most of Lesser Sundas (Satonda, Flores, Besar, Pantar, Alor, Semau, Timor, Wetar, Kisar, Romang, Leti, Moa, Luang, Sermata, Damar, Babar, Tanimbar).



Descriptive notes. 39-44 cm; 360-395 g. Head, including uppermost part of throat, pale mauve-pink or salmon pink; remainder of throat and neck pale grey; upper breast pinkish grey shading to pale mauve-pink on lower breast and belly; upperparts dull bronzy green and bluish green tinged with silvery grey; primaries blackish tinged silvery grey; tail blackish green; undertail-coverts chestnut; whitish ring around eye and white band at base of bill, but less prominent than in *D. pistrinaria*; iris dark brown, with narrow red orbital ring; bill blue-grey with red or purple cere; legs red or reddish purple. Sexes alike. Juvenile similar

but duller, with narrow buff fringes to feathers of wings and underparts.

Habitat. Inhabits a variety of forest types, ranging from primary and tall secondary along coast to lowland and hill forest; also woodland scrub and cultivation with trees; mainly in canopy. Typically found on small islands, but sometimes also recorded on coasts of larger islands, e.g. Sulawesi, and even inland; mainly in lowlands, but up to 120 m on Bacan, to c. 200 m on Alor, and to 1100 m on Timor.

Food and Feeding. Frugivorous, feeding on figs (*Ficus*); no further information on diet. Occurs in flocks of up to 20 birds, often associated with *D. concinna*.

Breeding. No information available. Presumably similar to the closely related *D. whartoni*.

Movements. No information. Given the species' preference for small islands, it is very likely sometimes to undertake inter-island movements in search of fruit.

Status and Conservation. Not globally threatened. Little information available, but species reported to be fairly common to common locally on some islands such as Tanimbar. Despite hunting pressure, species is reported to be easily approached and not particularly wary on Timor; apparently adaptable to a certain degree of habitat degradation.

Bibliography. Andrew (1992), Bishop (1992), Butchart *et al.* (1996), Christidis & Boles (1994), Coates & Bishop (1997), Dutson (1995), Gibbs (1990), Hellebrekers & Hoogerwerf (1967), Hoogerwerf (1963, 1966), Lambert

(1994b), MacKinnon (1988), MacKinnon & Philipps (1993), Mayr (1944b), Noske (1995), Sujatnika *et al.* (1995), Wells (1985), White & Bruce (1986), Whitten *et al.* (1987).

288. Christmas Imperial-pigeon

Ducula whartoni

French: Carpophage de Wharton

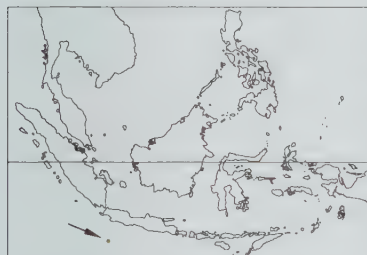
Spanish: Dúcula de la Christmas

German: Weihnachtsfruchttaube

Other common names: Christmas (Island)/Black/Dusky Pigeon/Imperial-pigeon

Taxonomy. *Carpophaga whartoni* Sharpe, 1887, Christmas Island, Indian Ocean. Closely related to *D. rosacea*, with which it is sometimes considered conspecific; these two form a superspecies with *D. pistrinaria* and *D. pickeringii*. Monotypic.

Distribution. Christmas I (Indian Ocean). Unsuccessfully introduced to Cocos (Keeling) Is during period 1885-1900.



Descriptive notes. 42-45 cm; 450-700 g. Head and neck dark purplish grey, with narrow grey-white area immediately above base of bill; bronzy green to purple iridescence on hind-neck; upperparts grey-black with oily green, blue-green or bronzy purple iridescence; throat, breast and upper belly grey-black, with green, purplish or reddish brown sheen; lower belly and vent dark sooty grey; undertail-coverts dark chestnut; underwing grey; iris bright yellow to orange; bill black; legs and feet dark reddish brown. Sexes alike. Juvenile very similar but duller, with darker and browner underparts.

Habitat. Primary and secondary rain forest on the inland plateau of Christmas I, including areas planted with the alien Japanese cherry (*Muntingia calabura*); less usually in littoral forest, although common there when food trees are in fruit.

Food and Feeding. Frugivorous; also occasionally takes buds and leaves; in addition to Rosaceae (*Muntingia*), important food sources include Myrtaceae (*Eugenia*, *Syzygium*), Moraceae (*Ficus*), Lauraceae, Meliaceae and Sapotaceae. Forages mainly in the canopy; may congregate in large numbers at abundant food sources, e.g. *Muntingia*.

Breeding. Reported to nest in loose groups late Aug to Feb. Nest is a flat, scanty platform of twigs, usually in the crown of a canopy tree, but sometimes as low as 4 m. Clutch probably 1 egg; chick naked on hatching, feathers appearing after 4-5 days; fledging c. 24-27 days.

Movements. Sedentary. Undertakes local movements to food and water sources, depending on availability.

Status and Conservation. **VULNERABLE.** Currently considered widespread and common, after having been hunted to near extinction by c. 1940, following the island's settlement in 1888. No current population estimates, but considered likely to number over 1000 birds. Although by end of 1987, c. 25% of the island was occupied by phosphate mines, mining operations were then cancelled and the Australian government placed a ban on further forest clearance. Most of the species' range is now included in the Christmas Island National Park, declared in 1980 and expanded in 1986 and 1989, and now covering c. 63% of the island, although not encompassing all of the pigeon's preferred habitat. Introduced *Muntingia calabura* provides a rich food source for much of the year, and this tree appears to be flourishing on many former mine fields and other disturbed areas. Illegal hunting continues, although on a much-reduced scale, and does not appear to be causing any further population decline; a closed season for hunting was originally introduced in 1904, and total legal protection followed in 1930-1932; however, this ban proved impossible to enforce, and an annual four-month closed season was operated 1933-1970, before full protection was again declared. Introduction to Cocos Is failed, presumably due to lack of suitable food trees or overhunting.

Bibliography. Andrews (1900), Brouwer & Garnett (1990), Chasen (1933), Christidis & Boles (1994), Collar & Andrew (1988), Collar *et al.* (1994), Diamond, A.W. (1985a), Garnett (1993), Hicks & Yorkston (1982), Higgins & Davies (1996), King (1978/79), Lister (1888), Stokes (1988), Stokes *et al.* (1984), White & Bruce (1986).

289. Grey Imperial-pigeon

Ducula pickeringii

French: Carpophage de Pickering

German: Pickeringfruchttaube

Spanish: Dúcula Gris

Other common names: Pickering's Imperial-pigeon, Grey Island-pigeon

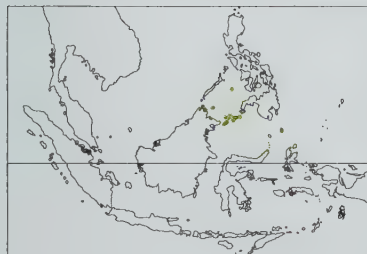
Taxonomy. *Carpophaga pickeringii* Cassin, 1854, Mangsi Islet, off north tip of Borneo. Forms a superspecies with *D. pistrinaria*, *D. rosacea* and *D. whartoni*. Validity of races has been questioned. Three subspecies currently recognized.

Subspecies and Distribution.

D. p. pickeringii (Cassin, 1854) - islets off N & NE Borneo and islets in Sulu Sea from Balabac and Cagayan to Sulu Is (S Philippines).

D. p. langhornei (Mearns, 1905) - W & E Bolod and Loran in C Sulu Is (S Philippines).

D. p. palmasensis (Mearns, 1909) - Miangas and Talaud Is (NE of Sulawesi).



Descriptive notes. 40 cm. Head light mauve or greyish pink with narrow white ring round eye and creamy white band at base of bill; neck, breast and underparts pale pinkish grey, pinkest on breast and throat and greyest on hindneck; mantle, back, rump and wings greenish grey with slight iridescence; tail blackish green, fading to dull grey on older feathers; undertail-coverts greyish pink with faint rufous tinge; iris dark reddish; orbital skin grey; bill bluish grey, darker at base; legs purplish red. Sexes alike, but female tends to be less pink on head and breast. Juvenile like adult, but with pale rufous fringes to feathers of underparts. Race *palmasensis* paler

and less pink on underparts; *langhornei* paler, with more conspicuous white ring round eye.

Habitat. Lowland forest on small islands, including primary and tall secondary forest; also degraded monsoon forest and cultivation with some trees.

Food and Feeding. Presumably frugivorous; only definite record concerns feeding on young leaves. Usually seen singly or in pairs; sometimes associates with *D. aenea*, and occasionally with *D. bicolor*. **Breeding.** Little information; a specimen with an egg was taken in Jan on Miangas; juvenile collected in Jul in Sabah.

Movements. Variable abundance on some islands and occasional appearance on adjacent mainland coasts suggest that species is nomadic to some extent, making inter-island flights.

Status and Conservation. **VULNERABLE.** Locally distributed on small islets. Limited information available indicates that the species is in decline throughout its limited range, although it remains locally common on some islets off Borneo; uncommon in Talaud Is. It is threatened by habitat loss and hunting; on many small islands off N & NE Borneo, native forest is being totally replaced by palm plantations.

Bibliography. Andrew (1992), Bishop (1992), Coates & Bishop (1997), Collar & Andrew (1988), Collar *et al.* (1994), Delacour & Mayr (1946), Dickinson *et al.* (1991), DuPont (1971), DuPont & Rabor (1973a), Eastwood (1995a), Gore (1968), Hachisuka (1932), Hornskov (1996), Kloss (1930), Lambert (1993b), MacKinnon & Philipps (1993), Manuel (1936d), McGregor (1909-1910), Riley, J. (1997), Riley, J.H. (1930), Smythies (1981), Sujatnika *et al.* (1995), Wells (1985), White & Bruce (1986).

290. Peale's Imperial-pigeon

Ducula latrans

French: Carpophage de Peale

German: Braunschwanz-Fruchttaube

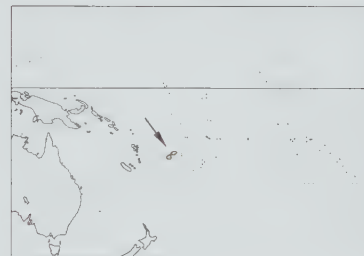
Spanish: Dúcula Ladradora

Other common names: Barking Pigeon, Fijian Imperial-pigeon

Taxonomy. *Carpophaga latrans* Peale, 1848, Fiji.

Forms a superspecies with *D. brechleyi*, *D. bakeri* and *D. goliath*; this group also shows some affinities with the *D. pinon* species-group. Monotypic.

Distribution. Fiji, mainly on large to medium-sized islands.



Descriptive notes. 40-41 cm. Upperparts ash grey; back and wings dark brown; underparts pale vinaceous grey, becoming buff on belly; undertail-coverts dark buff; wing-linings chestnut; bill blackish. Sexes alike. Juvenile similar, but duller, with faint rufous buff fringes to most feathers.

Habitat. Generally restricted to extensive tracts of mature native forest, from lowlands up to 1000 m; occurs typically on large to medium-sized islands, in contrast to *D. pacifica*, which is found on the smaller Fijian islands.

Food and Feeding. Frugivorous, feeding on a variety of fruits. Favours large fruits (12-

25+ mm in diameter), including *Cananga* (Annonaceae), *Dysoxylum* (Meliaceae) and nutmeg (*Myristica*, Myristicaceae), which it clumsily snaps off small branches. Usually seen singly or in pairs, but may occur in small groups at fruiting trees.

Breeding. Breeds May-Jan, although peaks in nesting probably vary locally. Nest is an insubstantial platform of twigs built in the fork of a lateral branch. Lays 1 white egg.

Movements. Little known, with no movements recorded. A strong flier.

Status and Conservation. Not globally threatened. Still fairly common in the interior of Vanua Levu, Taveuni and Rabi, though populations reduced by hunting and habitat loss in more settled areas, especially on Viti Levu; populations require monitoring.

Bibliography. Amadon (1943), Clunie (1984), Dahl (1986), Holyoak (1979), Holyoak & Thibault (1978), Langham (1985), Mayr (1945b), Pratt *et al.* (1987), Watling (1982a).

291. Chestnut-bellied Imperial-pigeon

Ducula brechleyi

French: Carpophage de Brechley

Spanish: Dúcula de las Salomón

German: Brechleyfruchttaube

Other common names: Chestnut-bellied Pigeon

Taxonomy. *Carpophaga Brechleyi* G. R. Gray, 1870, San Cristobal, Solomon Islands.

Forms a superspecies with *D. latrans*, *D. bakeri* and *D. goliath*; this group also shows some affinities with the *D. pinon* species-group. Monotypic.

Distribution. Guadalcanal, Malaita and San Cristobal (E Solomon Is).



Descriptive notes. 40 cm. Head silvery grey washed pinkish rufous on throat and face, becoming dark blue-grey on hindneck and blackish grey with silvery iridescence on back, rump, wings and central tail feathers; outer tail feathers dark chestnut with some black on tips and outer webs; underwing-coverts and undertail chestnut; upper breast dark purplish pink becoming dark chestnut on rest of underparts; iris dark red; bill blackish; legs and feet dark red. Sexes alike. Juvenile similar to adult, but duller overall; breast greyish with buff tips and centres to feathers, and ill-defined rufous barring; throat buffish.

Habitat. Forest; originally occurred from coastal lowlands to mountains, but currently reported to occupy only the altitude range of 200-700 m, reflecting severe deforestation of coastal areas.

Food and Feeding. Little information. Frugivorous; reported to feed in same trees as *D. pistrinaria*.

Breeding. No information available.

Movements. No information available.

Status and Conservation. **ENDANGERED.** There are no estimates of population numbers, but the lowland and foothill forest habitat favoured by the species is under severe logging pressure on Guadalcanal, most is under concession on San Cristobal, and the timber industry is important on Malaita. Until recently remained moderately common in hill forest on San Cristobal, but now apparently declining rapidly; reports from other islands indicate that it is rare, with no recent records outside San Cristobal. Species is apparently subject to hunting pressure throughout its range.

Bibliography. Cain & Galbraith (1956), Collar *et al.* (1994), Dahl (1986), Galbraith & Galbraith (1962), Gibbs (1996), Lees (1991), Mayr (1945b).

292. Vanuatu Imperial-pigeon

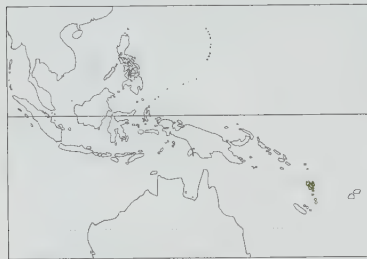
Ducula bakeri

French: Carpophage de Baker

Spanish: Dúcula de Nuevas Hébridas

German: Kurzflügel-Fruchttaube

Other common names: Vanuatu Mountain-pigeon, Baker's Imperial-pigeon/Pigeon

Taxonomy. *Muscadivora bakeri* Kinnear, 1928, Santo, Vanuatu.Forms a superspecies with *D. latrans*, *D. brencchleyi* and *D. goliath*; this group also shows some affinities with the *D. pinon* species-group. Monotypic.**Distribution.** Banks Is (Ureparapara, Vanua Lava, Gaua) and N Vanuatu (Espiritu Santo, Ambae, Maewo, Pentecost, Ambrym).**Descriptive notes.** c. 40 cm. Head pale slate grey, paler on forehead and throat; mantle, wings and tail dark slate-grey; collar, back and breast dark chestnut with slight purplish gloss; abdomen rufous-brown; undertail-coverts bright cinnamon; iris yellow with red outer ring; legs and feet bright red. Sexes similar, but female slightly smaller and less brightly coloured. Juvenile much duller, lacking any iridescence and with narrow rufous fringes to feathers of back and wings.**Habitat.** Primary montane rain forest above 600 m, mainly on larger islands of the region. Although present species occurs with the eco-logically similar *D. pacifica* on several northern islands, the two species are segregated by altitude, *D. pacifica* preferring lowland and foothill forests.**Food and Feeding.** Little information. Frugivorous, feeding on the fruits and berries of a variety of native trees, shrubs and vines, and possibly palms. Forages primarily in the canopy and subcanopy, although occasionally feeds in low shrubs; usually seen singly or in pairs, but occasionally in groups of up to 6 birds.**Breeding.** No specific information; habits considered likely to be similar to those of *D. pacifica*.**Movements.** Little information. Reported to be locally nomadic in response to fruit availability; will fly considerable distances on some islands.**Status and Conservation.** VULNERABLE. Population estimated at less than 10,000 individuals and declining. Threatened by hunting, which is permitted during Apr-Jun, as with other pigeons on Vanuatu; another important threat is loss of habitat. Populations require monitoring; research needed. **Bibliography.** Amadon (1943), Bregulla (1992), Collar *et al.* (1994), Dahl (1986), Mayr (1945b), Toone *et al.* (1993).

293. New Caledonian Imperial-pigeon

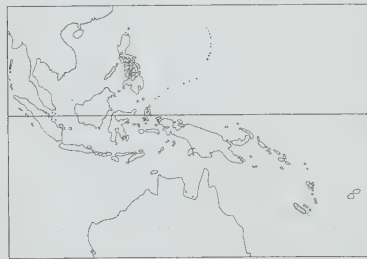
Ducula goliath

French: Carpophage géant

German: Riesenfruchttaube

Spanish: Dúcula Goliat

Other common names: Goliath Pigeon, Giant Imperial-pigeon

Taxonomy. *Carpophaga (Phaenorrhina) goliath* G. R. Gray, 1859, Isle of Pines, New Caledonia.Forms a superspecies with *D. latrans*, *D. brencchleyi* and *D. bakeri*; this group also shows some affinities with the *D. pinon* species-group. Monotypic.**Distribution.** New Caledonia and I of Pines.**Descriptive notes.** c. 50 cm; 600-716 g. Very large, dark imperial-pigeon; general plumage dark slate-grey with slight silvery bloom on neck, breast and wings; neck and breast feathers long and bifurcated; basal half of primaries silvery grey, forming large pale patch on spread wing; dull purple patch on inner wing-coverts; belly chestnut becoming pale rufous on vent and undertail-coverts; tail dark slate at base and tip, with dark chestnut central band; undertail light chestnut with grey terminal band; iris orange and red; bill red with horn-coloured tip; feet and legs red. Sexes alike. Juvenile duller, with rusty edging to most wing-coverts.**Habitat.** Primary montane forest.**Food and Feeding.** Little information. Frugivorous; feeds on fruits and berries, reportedly including the introduced chili pepper (*Capsicum*).**Breeding.** Specimens taken in late Jul showed almost no gonadal enlargement, and an adult female taken in mid-Dec had apparently completed nesting. The only nest described was of twigs 12 cm

deep, 30 cm in diameter, placed in a tree fork c. 3 m above ground; it contained a single, near naked nestling in early Nov. Local people report that most nests are placed in epiphytic ferns growing against trunks of large trees.

Movements. No information.**Status and Conservation.** VULNERABLE. Threatened by destruction of its montane forest habitat and by hunting, which is apparently extremely intense. Birds will permit close approach, even to a poor imitation of its call. In the late 19th and early 20th centuries, species was described as abundant and very widespread, but it was already under threat from hunting in mid-1940's and is now generally rare, favouring relatively undisturbed montane forest. It is reported to be common in riverine forest in the Rivière Bleue Park; there is also a small population on I of Pines.**Bibliography.** Amadon (1943), Collar & Andrew (1988), Collar *et al.* (1994), Dahl (1986), Hannecart (1988), Hannecart & Létocart (1980), Hay (1986), King (1978/79), Layard & Layard (1882), Mayr (1945b), Mittermeier *et al.* (1996), Vuilleumier & Gochfeld (1976).

294. Pinon's Imperial-pigeon

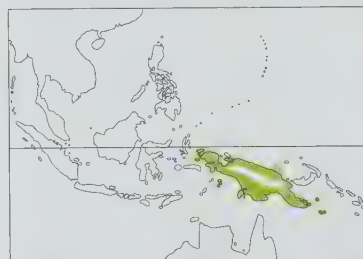
Ducula pinon

French: Carpophage pinon

German: Rotaugen-Fruchttaube

Spanish: Dúcula de Pinon

Other common names: Bare-eyed Imperial-pigeon, Pinon/Black-shouldered Fruit-pigeon

Taxonomy. *Columba Pinon* Quoy and Gaimard, 1824, Luwak, Western Papuan Islands.Often placed in a species-group with *D. melanochroa* and *D. mullerii*; affinities have also been suggested between these species and the *D. latrans* superspecies. Validity of race *rubensis* questionable. Four subspecies currently recognized.**Subspecies and Distribution.***D. p. pinon* (Quoy & Gaimard, 1824) - W Papuan Is (Misool, Salawati, Batanta, Waigeo) and Aru Is to Vogelkop and CS New Guinea (R Mimika to Hall Sound).*D. p. jobiensis* (Schlegel, 1873) - Yapen I, N New Guinea (E to Huon Gulf) and islands off N coast (Manam, Karkar, Bagabag).*D. p. rubensis* (A. B. Meyer, 1884) - S shores of Geelvink Bay, and coasts of Onin Peninsula E to Etna Bay; SE New Guinea (E from R Kumusi and R Aroa).*D. p. salvadorii* (Tristram, 1882) - D'Entrecasteau Is (Goodenough, Fergusson) and Louisiade Archipelago (Misima, Tagula, Rossel).**Descriptive notes.** 44-48 cm; 783-802 g. A very large pigeon with a prominent area of bare red skin around eye; general plumage mauve-grey to grey, darker on wings and tail, paler on forehead and becoming dark maroon-chestnut on lower breast and abdomen; narrow band of white at base of long, heavy bill, and narrow but conspicuous white ring bordering red orbital skin; lower mantle, back and rump light bluish or silvery grey; black and black-tipped feathers on scapulars form a broad V on back; tail dark grey with narrow white or pale grey central band; iris blood red; bill dark grey with pale grey tip; legs and feet reddish. Sexes alike.Juvenile similar to adult, but paler and duller. Race *jobiensis* has grey areas paler, and wing and uppertail-coverts black fringed silvery grey, producing scaled effect; *rubensis* very similar to previous race, but has less distinct scaly pattern, the feathers being slate grey rather than black; *salvadorii* has entire head pale pink, becoming deeper on mantle and upper back, which are entirely pink except for black scapulars, while underparts are greyer but still brighter and paler than other forms, sharply demarcated from chestnut lower breast.**Habitat.** Forest, partially cleared areas and monsoon forest, primarily in the lowlands, but locally up to 900 m in E Papua New Guinea.**Food and Feeding.** Little information. Frugivorous; feeds on a variety of fruits and berries. Forages in the canopy; usually seen singly, in pairs or in small flocks of up to 11 birds.**Breeding.** One nest found in early Feb in New Guinea, and others in late Mar to Apr in Irian Jaya; birds in breeding condition collected in May, Jul, Sept-Oct and Dec in Trans-Fly area of S New Guinea. Little information. Nest is a scanty platform of twigs, placed high in a tree (one nest at 11 m, another at 18 m), e.g. a *Sonneratia* mangrove. Lays 1 white egg.**Movements.** Little information. Probably locally nomadic in response to fruit availability; sometimes seen in direct flight high above the forest canopy in early morning.**Status and Conservation.** Not globally threatened. Status poorly known. Reported to be fairly common in many areas, and even locally abundant, e.g. in Madang Province, Papua New Guinea; however, described as uncommon in the Ok Tedi area of Western Province, and fairly common in Varirata National Park, near Port Moresby.**Bibliography.** Andrew (1992), Bailey (1992a), Bechler *et al.* (1986), Blaszkiewicz (1994a), Burrows (1993), Coates (1985), Diamond (1972a, 1975c), Erfmeijer *et al.* (1991), Gregory (1995a, 1995b), Hiaso *et al.* (1994), Mayr & Rand (1937), Mees (1982a), Ogilvie-Grant (1915), Rand (1942a), Rand & Gilliard (1967), Ripley (1964), Tubb (1945).



295

296

297

ssp badia

ssp lacermulata

299

ssp williamsi

ssp insignis

ssp cuprea

298

ssp griseicapilla

ssp sasakensis

301

white bird

ssp spilorrhoea

grey bird

302

ssp subflavescens

ssp cineracea

300

ssp schistacea

ssp novaeseelandiae

305

ssp chathamensis

303

304

306

ssp exsul

♂ 307

♀

ssp mada

♂

♀

ssp albertisii

♂

308

ssp stalkeri

309

PLATE 26

inches 9
cm 23

295. Bismarck Imperial-pigeon

Ducula melanochroa

French: Carpophage noir **German:** Mohrenfruchtttaube **Spanish:** Dúcula Negra
Other common names: Black/Silver-laced Imperial-pigeon

Taxonomy. *Carpophaga melanochroa* P. L. Slater, 1878. Duke of York Island, Bismarck Archipelago.

Often placed in a species-group with *D. pinon* and *D. mullerii*, and exhibits some plumage characters intermediate between the two; affinities have also been suggested between these three species and the *D. latrans* superspecies. Monotypic.

Distribution. Bismarck Archipelago (Umboi, New Britain, Watom, Duke of York, New Ireland).



Descriptive notes. 38 cm; 661-665 g. Plumage mainly slaty black, with silvery fringes to wing-coverts and back, creating lacy scaled pattern; undertail-coverts dark chestnut; undertail silvery grey; iris red; bill greyish blue with black tip; legs and feet dark reddish. Sexes similar. Juvenile similar but with paler chestnut undertail-coverts.

Habitat. Forest, principally in hills and mountains, but seasonally in lowlands of New Britain, down to 150 m; occurs up to 1850 m on New Britain, at 300-700 m on Umboi, and at 700-1800 m on New Ireland.

Food and Feeding. Little information. Frugi-

vorous; known to take wild figs. Feeds primarily in the canopy; usually seen singly or in small flocks. **Breeding.** Single nest known from late Jan 1994 on New Ireland. Nest was 23 cm in diameter, constructed solely of layered twigs, with no lining; it was placed between two large limbs of a moss-covered tree, c. 4 m above ground; located in cloud forest at 1760 m. It contained 1 freshly laid white egg.

Movements. No information. Reported to become locally common seasonally in lowlands of New Britain, perhaps suggesting some seasonal altitudinal movements, but this requires verification.

Status and Conservation. Not globally threatened. Currently considered near-threatened. Virtually no information available on status, although species has been described as common in New Britain; it appears able to tolerate selectively logged forest on New Ireland. Research and survey work required.

Bibliography. Bishop (1987), Coates (1985), Collar *et al.* (1994), Dahl (1986), Diamond (1975c), Eastwood (1995c), Gilliard & LeCroy (1967a), Hartert (1925a, 1926), Hedemark (1995).

296. Collared Imperial-pigeon

Ducula mullerii

French: Carpophage de Müller **German:** Schwarzhals-Fruchtttaube **Spanish:** Dúcula Acollarada
Other common names: Muller's/Pink-capped/Black-collared Imperial-pigeon/Fruit-pigeon; Collared Imperial Fruit-pigeon

Taxonomy. *Columba mullerii* Temminck, 1835. Dourga River, New Guinea. Often placed in a species-group with *D. pinon* and *D. melanochroa*; affinities have also been suggested between these species and the *D. latrans* superspecies. Racial differences slight, and validity may require reassessment. Original spelling is *mullerii*, rather than *mullerii* or *mulleritii*. Two subspecies recognized.

Subspecies and Distribution.

D. m. mullerii (Temminck, 1835) - N New Guinea from E shore of Geelvink Bay E to Astrolabe Bay. *D. m. aurantia* (A. B. Meyer, 1893) - Aru Is and S New Guinea from R Mimika E to R Brown, including offshore islands of Boigu and Daru.



Descriptive notes. 38-41 cm; 540-650 g. Forehead, lores and crown greyish pink; lower face, chin and throat silvery grey; distinctive black collar completely encircles neck, broadest at hindneck; separated from grey-pink crown by narrow silver-grey line; mantle maroon; rest of upperparts dark grey; tail black with broad pale grey central band; underparts dark mauve-pink, becoming maroon along breast sides; incomplete broad white to silvery grey band across upper breast separates black collar from dark pink underparts; vent and undertail-coverts dark reddish chestnut; undertail black with prominent pale central band; iris brown; bill

greyish; feet purplish red. Sexes alike. Race *aurantia* differs in having paler underparts, brighter but less extensive maroon mantle and paler crown.

Habitat. Primary rain forest in the lowlands, especially along rivers; also swamp forest and mangroves.

Food and Feeding. Frugivorous; feeds on a variety of fruits, including members of the Arecaceae, Annonaceae and Sapindaceae. Seen singly or in pairs, occasionally in small flocks.

Breeding. Occurs in both wet and dry seasons; eggs in Western Province in mid-Jul, in Trans-Fly from mid-Sept to Oct, and in R Sepik area in late Dec; a nestling was collected on Daru in Apr; in Irian Jaya, three occupied nests found in mid-Mar. Reported to breed colonially in mangroves or on small islands. Nest is a slight, flat platform of twigs, placed on a horizontal branch, usually over water; recorded at height of 1.5-6 m. Lays 1 white egg.

Movements. Little information. Like other *Ducula*, probably undertakes extensive local movements regularly, in response to fruit availability. One bird recorded flying fast and direct to Boigu I, apparently from Papua New Guinea mainland (c. 7 km). Flies strongly above the canopy.

Status and Conservation. Not globally threatened. Usually considered to be common, but little specific population information available. Described as commonest pigeon in the Bintuni Bay area of NW Irian Jaya; over 200 birds were recorded in the R Turama area in mid-Jul 1988; 100 birds in the R Fly area (N of Kiunga) in Aug 1992, and the R Elevala area in early Apr 1994. Considered rare in the Ok Tedi area of Western Province, Papua New Guinea.

Bibliography. Andrew (1992), Anon. (1994a), Beehler *et al.* (1986), Burrows (1993), Coates (1985), Draffin (1980), Erfteimeijer *et al.* (1991), Frith, Crome & Wolfe (1976), Gilliard & LeCroy (1966), Gregory (1995a, 1995b), Higgins & Davies (1996), Johnston & Richards (1994), Mees (1982a), Rand (1942a), Rand & Gilliard (1967), Rutgers & Norris (1970).

297. Zoe's Imperial-pigeon

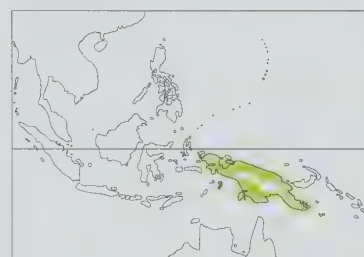
Ducula zoeae

French: Carpophage de Zoé **German:** Halsband-Fruchtttaube **Spanish:** Dúcula de Zoé
Other common names: Banded Imperial-pigeon, Zoe's/Banded/Bar-breasted Fruit-pigeon

Taxonomy. *Columba Zoeae* Lesson, 1826. Manokwari, New Guinea.

A distinctive form with no clear close relatives; has been suggested to have affinities with *D. mullerii*, based on the attenuated first primary present in both species. Monotypic.

Distribution. Salawati and Aru Is through New Guinea (including Yapen, Karkar) to D'Entrecasteaux Is (Goodenough, Fergusson), Basilaki I and Louisiade Archipelago (Misima).



Descriptive notes. 38-41 cm; 575-592 g. Head pale grey; neck, upper mantle and upper breast pale greyish pink; lower mantle and wing-coverts purplish chestnut; rest of upperparts including tail dark glossy or bronzy green; narrow black band across middle of breast; lower breast and abdomen pale grey; tibial feathers and undertail-coverts purplish chestnut with white mottling; undertail chestnut; iris white; bill dark grey; feet red. Sexes alike. Juvenile similar but with less distinct breast band, no iridescence on upperparts and more buff on neck.

Habitat. Rain forest and monsoon forest, primarily in the lowlands, but locally up to 1450 m; frequents forest edge more than its congeners; roosts in palms or prominent dead trees.

Food and Feeding. Frugivorous; feeds on a variety of fruits, including members of Arecaceae (*Arenga*, *Caryota*), Lauraceae (*Litsea*, *Neolitsea*), Annonaceae (*Cananga*), Moraceae (*Ficus*) and Combretaceae (*Terminalia*); unlike many other New Guinea fruit pigeons, reported not to be as attracted to figs. Feeds primarily in the canopy, but occasionally comes to the ground to drink; seen singly, in pairs or infrequently in small flocks of up to 10 birds.

Breeding. Little information. Breeding apparently commences at end of dry season, as males taken in Jul had small gonads, but a female obtained in early Aug had enlarged ovary and two males taken in mid-Aug had enlarged testes; in E New Guinea, nest building reported in mid-Jul and late Aug; a pair was observed nesting in the "bowl" of a dead tree in mid-Sept at R Baiyer, and reported breeding in the same area in Dec; adults observed carrying nesting material in Sept at R Kuriva, and a nestling was obtained in Trans-Fly region in late Jan. Nest and eggs apparently undescribed.

Movements. Little information. Sometimes observed in swift, direct flight above the canopy.

Status and Conservation. Not globally threatened. Widely distributed and often the commonest *Ducula* species in its range, especially in foothill forest. Described as common in NE & E highlands of New Guinea. In Western Province (Papua New Guinea); population estimated at 5 birds per 10 ha in lowland forest near R Brown; and species described as common in coastal lowlands, up to 750 m in the Ok Tedi area, and also in the Guavi-Wawoi logging area.

Bibliography. Andrew (1992), Bailey (1992a), Beehler (1978b), Beehler *et al.* (1986), Bellchambers *et al.* (1994), Bishop (1977), Coates (1985), Diamond (1972a, 1975c), Frith, Crome & Wolfe (1976), Gilliard & LeCroy (1961), Gregory (1995a, 1995b), Hiaso *et al.* (1994), Hoogerwerf (1971), Mayr & Rand (1937), Mees (1982a), Rand & Gilliard (1967), Ripley (1964).

298. Mountain Imperial-pigeon

Ducula badia

French: Carpophage à manteau brun **Spanish:** Dúcula Dorsicastaña

German: Fahlbauch-Fruchtttaube
Other common names: Hodgson's/Jerdon's/Bronze-backed/Grey-headed(!)/Band-tailed Imperial-pigeon

Taxonomy. *Columba badia* Raffles, 1822, Bengkulu, west Sumatra.

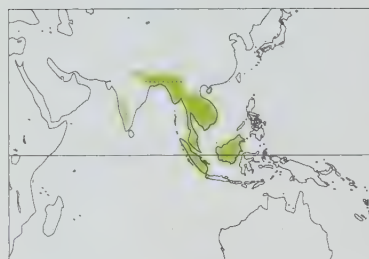
Probably forms a superspecies with *D. lacernulata* and *D. cineracea*, although ranges of present species and *D. lacernulata* overlap in W Java. Four subspecies recognized.

Subspecies and Distribution.

D. b. cuprea (Jerdon, 1840) - Western Ghats (SW India) from Goa and NW Karnataka S to Kerala. *D. b. insignis* Hodgson, 1836 - W Nepal, Sikkim and Bhutan E to Khasia Hills and R Brahmaputra. *D. b. griseicapilla* Walden, 1875 - Myanmar (to N Tenneserim) and Thailand E to SC China (SW Yunnan, Hainan), and S to Laos, Vietnam and Cambodia. *D. b. badia* (Raffles, 1822) - S Tenneserim and Mergui Archipelago S through Malay Peninsula to Sumatra, Borneo and W Java.

Descriptive notes. 43-51 cm; 580-665 g. Head, neck and underparts pink, brightest on hindneck and more or less suffused with grey elsewhere; crown and sides of face pale grey; chin and throat white; mantle, lesser and median wing-coverts dark reddish purple; back, rump and greater wing-coverts dark greyish brown with purple fringes, the purple fades to chestnut in worn plumage; primaries and secondaries blackish brown; tail blackish brown with broad, light grey terminal band; underside of tail grey with silver-grey terminal band; ventral regions and undertail-coverts creamy buff; iris white or grey-white; orbital skin dark red; bill dark pink or red with paler tip; legs dark red with pale claws. Sexes alike. Juvenile duller, rusty brown in areas where adult purplish. Race

On following pages: 299. Dark-backed Imperial-pigeon (*Ducula lacernulata*); 300. Timor Imperial-pigeon (*Ducula cineracea*); 301. Pied Imperial-pigeon (*Ducula bicolor*); 302. Torresian Imperial-pigeon (*Ducula spilorrhoa*); 303. White Imperial-pigeon (*Ducula luctuosa*); 304. Topknot Pigeon (*Lopholaimus antarcticus*); 305. New Zealand Pigeon (*Hemiphaga novaeseelandiae*); 306. Sombre Pigeon (*Cryptophaps poecilorrhoa*); 307. Papuan Mountain-pigeon (*Gymnophaps albertisii*); 308. Long-tailed Mountain-pigeon (*Gymnophaps mada*); 309. Pale Mountain-pigeon (*Gymnophaps solomonensis*).



griseicapilla has extensive purple areas on upperparts, grey tinge to rump, pale grey crown and face which contrasts with pink hindneck, pale grey underparts, and cream undertail-coverts; *insignis* resembles previous race but has entirely pink head; *cupreus* has wings and mantle dark brown rather than purplish, iris brown.

Habitat. Mature forest from foothills up to 2300 m; in Sumatra, Borneo and W Java and some other areas, often visits lowlands and coastal mangroves, perhaps seasonally; rarely enters scrub forests.

Food and Feeding. Frugivorous, feeding on a variety of fruits and berries, as well as occasional buds and young leaves. In India, reported to favour figs (*Ficus*) and wild nutmeg (*Myristica*). Typically seen in pairs or small flocks.

Breeding. Season apparently extended; for race *insignis* reported to be Mar-Aug; for race *cupreus* Jan-May. Nest is a slight platform of twigs, placed 5-8 m up in a sapling or understorey tree. Lays 1 white egg; incubated by both sexes, but incubation and fledging periods unknown.

Movements. Generally appears to be resident. In India, seasonally undertakes local and altitudinal movements in response to fruit availability. In Borneo and Sumatra, coastal birds make daily trips inland, and montane birds make daily trips to lowland feeding areas. A powerful flier, often seen in sustained flights well above the canopy.

Status and Conservation. Not globally threatened. Information from across its range is rather limited, but species reported to be the commonest large pigeon of foothill and montane forest in Borneo and Sumatra; considered rare in Java. Common in Thailand, although numbers have been reduced by hunting; also common in mountains of Malay Peninsula.

Bibliography. Ali (1996), Ali & Ripley (1981), Bhattacharyya (1990), Davison (1992), Deignan (1945), Étchéopar & Hùe (1978), Goodwin (1973a), Harrison (1973), Hellebrekers & Hoogerwerf (1967), Holmes (1996), Inskipp & Inskipp (1991), Lekagul & Round (1991), MacKinnon & Philipps (1993), Madoc (1976), van Marle & Voous (1988), Medway & Wells (1976), Parrott & Andrew (1996), Smythies (1981, 1986), Stepanyan (1995), Thiollay (1995), Yang Lan *et al.* (1995).

299. Dark-backed Imperial-pigeon

Ducula lacernulata

French: Carpophage mantelé

Spanish: Dúcula Dorsioscura

German: Schwarzücken-Fruchttaube

Other common names: Javanese/Black-backed Imperial-pigeon, Javanese Mountain-pigeon

Taxonomy. *Columba lacernulata* Temminck, 1823, Java.

Probably forms a superspecies with *D. badia* and *D. cineracea*, although ranges of present species and *D. badia* overlap in W Java. Three subspecies recognized.

Subspecies and Distribution.

D. l. lacernulata (Temminck, 1823) - W Java.

D. l. williami (Hartert, 1896) - E Java and Bali.

D. l. sasakensis (Hartert, 1896) - Lombok, Sumbawa and Flores.



Descriptive notes. 39-45 cm. Forehead, face, and crown bluish grey; throat, neck and breast mauve-pink with a silvery grey wash, shading to buffy grey on belly; upperparts dark brownish grey with a bronzy green sheen, most intense on wings; tail feathers greyish black with broad grey terminal band; underside of tail dark grey with silvery terminal band; undertail-coverts chestnut; iris dark red; bill blackish, dark grey or bluish grey; legs red to purplish red. Sexes alike. Juvenile not described. Race *williami* has no grey on pinkish head; *sasakensis* has sides of face and ear-coverts pink, forehead and crown grey, belly and undertail-coverts

pinkish brown, and mantle and wings darker with a more pronounced greenish tinge.

Habitat. Forest in foothills and mountains, usually in canopy; also *Casuarina* woodland on Flores, and cultivation with trees. Recorded at 400-2500 m, mostly above 850 m; exceptionally down to 150 m.

Food and Feeding. Frugivorous; diet includes figs (*Ficus*). Forages in canopy of large forest trees; occasionally alone or in pairs, but usually in small flocks of up to 5 birds.

Breeding. Nesting or other breeding activity recorded in Mar, Aug, Oct and Nov. Nest is a flat platform of twigs placed high up. Lays 1 egg.

Movements. Variable abundance in some areas suggests species may be nomadic to some extent.

Status and Conservation. Not globally threatened. Locally common in medium-altitude and montane forests, especially in areas that are well away from human disturbance. Moderately common above 850 m in Lesser Sundas; reported to be shy on Flores, probably as consequence of hunting pressure, and may be under-recorded. On Bali, also shy but locally frequent e.g. at Bedugul Lake Ridge.

Bibliography. Andrew (1985, 1992), Andrews (1988), Bartels (1906), Butchart *et al.* (1993, 1996), Coates & Bishop (1997), Gibbs (1990), Hellebrekers & Hoogerwerf (1967), MacKinnon (1988), MacKinnon & Philipps (1993), McKean (1987), Mees (1996), Robinson & Kloss (1924), Schmutz (1977), Stresemann (1930), Sujatnika *et al.* (1995), White & Bruce (1986).

300. Timor Imperial-pigeon

Ducula cineracea

French: Carpophage cendrillon

German: Schieferrücken-Fruchttaube

Spanish: Dúcula de Timor

Other common names: Ashy Imperial-pigeon

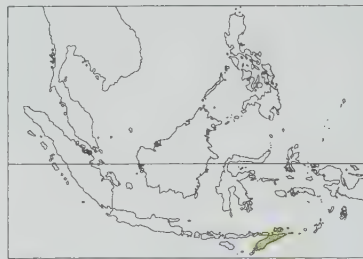
Taxonomy. *Columba cineracea* Temminck, 1835, Timor.

Probably forms a superspecies with *D. badia* and *D. lacernulata*. Claimed racial differences are slight, based on limited material, and may not be worthy of recognition. Two subspecies recognized.

Subspecies and Distribution.

D. c. cineracea (Temminck, 1835) - Timor.

D. c. schistacea Mayr, 1944 - Wetar.



Descriptive notes. 39-45 cm. Head and neck dull bluish grey grading to darker slate-grey on upperparts; wings and tail show a faint greenish sheen in some lights; primaries have narrow buff fringes on outer webs; median line of throat and breast dull mauve-pink shading to buff on belly and undertail-coverts; iris dark; bill black; legs dark purplish. Sexes alike. Juvenile has reddish buff fringes to wing-coverts, and rufous tips to tail feathers. Race *schistacea* generally darker, with underparts strongly washed with grey.

Habitat. Mountain forest, preferring areas dominated by *Eucalyptus* in some areas; also

monsoon woodland; reported at altitudes of 500-2200 m.

Food and Feeding. No information available on diet. Forages in dense canopy of fruiting trees; seen alone, in pairs or in groups of up to 4 birds.

Breeding. No information available.

Movements. No information available.

Status and Conservation. **VULNERABLE.** Restricted to montane forest on Timor and Wetar; little of such habitat is available on Timor, where the species is reported to be generally uncommon, though locally common, particularly in *Eucalyptus euryphila* forest. Current status on Wetar is unknown. Species is vulnerable to habitat loss and hunting.

Bibliography. Andrew (1992), Coates & Bishop (1997), Collar *et al.* (1994), Gibbs (1990), Hartert (1904), Mayr (1944b), Noske (1995), Sujatnika & Jepson (1995), Sujatnika *et al.* (1995), White & Bruce (1986).

301. Pied Imperial-pigeon

Ducula bicolor

French: Carpophage blanc

German: Zweifarben-Fruchttaube

Spanish: Dúcula Bicolor

Other common names: White/Nutmeg Imperial-pigeon, Nutmeg Pigeon, White Fruit-pigeon

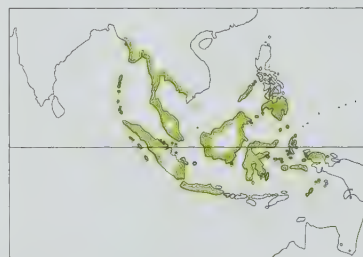
Taxonomy. *Columba bicolor* Scopoli, 1786, New Guinea.

Forms a distinctive superspecies with *D. spilorrhoa* and *D. luctuosa*; species limits in this group are unclear, and all three sometimes considered conspecific; other authors recognize up to five species; further study required. Race *melanura* has sometimes been classified as a separate species, but alternatively it has been considered a mere colour morph, unworthy of taxonomic recognition; there is evidence that both nominate *bicolor* and race *melanura* occur sympatrically on Kai, Ambon, Bacan, Halmahera and perhaps other islands, which has alternatively been interpreted as evidence that the forms are reproductively isolated full species, or that they are mere colour morphs. Two subspecies recognized.

Subspecies and Distribution.

D. b. bicolor (Scopoli, 1786) - coasts and small islands from Andaman and Nicobar Is, W Myanmar, Malay Peninsula, peninsular and coastal Thailand and Cambodia through Indonesia and Philippines to W Papuan Is (Salawati, Misool) and coastal Vogelkop (W New Guinea).

D. b. melanura (G. R. Gray, 1860) - Moluccas, on Bacan, Halmahera, Obi, Seram, Buru, Ambon, Kai Is, Moti and Muor; also Komodo and Tanimbar Is (Lesser Sundas).



Descriptive notes. 35-42 cm; 365-510 g. Pure white, more or less tinged with yellow, except for black primaries, primary coverts, outer secondaries and tail; black sometimes has silvery grey lustre; bill grey or bluish with darker tip; legs and feet greyish blue. Sexes alike. Juvenile has white areas suffused grey and broad yellow-buff fringes to most feathers. Race *melanura* said to differ in having black markings on undertail-coverts and more extensive black on tail; however, there is some evidence that these traits are subject to individual variation.

Habitat. Coastal forests, mangroves and coconut plantations. Typically nests and roosts on small offshore islands, but often visits coastal regions of the mainland and large islands to feed. Primarily in lowlands, but *melanura* reported to 1100 m.

Food and Feeding. Frugivorous; feeds on a variety of fruits and berries, including wild figs and the large fruits of wild nutmegs (*Myristica*). Feeding is almost entirely or entirely arboreal. On Sipadan I, off E Sabah (NE Borneo), seen to descend regularly to rock pools exposed at low tide, although purpose of this behaviour unclear.

Breeding. Data on seasonality is scanty: breeds Dec-Mar in Andaman and Nicobar Is; half-fledged young collected on Seram in Sept and Nov; all four Sumatran breeding records from Apr; breeds Aug in Java; a female collected on Fatima (SE Philippines) in early Apr contained a fully developed egg. Usually breeds in colonies on offshore islets; in Sumatra, nests mainly in mangroves; nest is a flimsy platform; in Andamans, nests reported to be placed mostly 7-8 m up. Usually 1 egg, occasionally 2.

Movements. Reported to make seasonal movements in some areas, e.g. Wallacea, but detailed information lacking. May cover long distances between feeding sites and nesting colonies and roosts. Typically in flocks, especially when flying over sea, up to 70 m above the water, between roosting or nesting areas on islets and feeding areas on the mainland; flight strong and direct, with a loud clatter of wings when flushed.

Status and Conservation. Not globally threatened. Can be locally abundant, e.g. in Manusela National Park (Seram), but highly vulnerable to hunting and disturbance at nesting colonies. Locally common in S Thailand and Sulawesi. Formerly regarded as common on islands off S Vietnam but no recent data; still locally abundant on many small islands off Sumatra (e.g. Riau) and Borneo. Protected in Sarawak since 1957. Now rare in Java and Bali due to excessive hunting. Considered uncommon throughout most of Philippines, where perhaps already hunted to near-extinction on Negros and Mindoro; there is a count of 9190 birds roosting on Ursula in May 1987. Recently recorded on Haruku (CS Moluccas).

Bibliography. Abdulali (1978), Ali & Ripley (1981), Baker (1913), Beehler *et al.* (1986), Bishop (1992), Bowler & Taylor (1989), Butchart *et al.* (1996), Christidis & Boles (1994), Coates & Bishop (1997), Delacour & Mayr (1946), Dickinson *et al.* (1991), Hadgkiss & Mitchell (1983b), Hellebrekers & Hoogerwerf (1967), Holmes & van Balen (1996), Hoogerwerf (1967, 1969), Hornslov (1996), Jepson (1993), Johnstone (1981), Lekagul & Round (1991), MacKinnon (1988), MacKinnon & Philipps (1993), Madoc (1976), van Marle & Voous (1988), Medway & Wells (1976), Nash & Nash (1987), Rabor (1977), Rand & Rabor (1960), Round (1988), Rutgers & Norris (1970), Smythies (1981, 1986), Tikader (1984), Wells (1985), White & Bruce (1986), Whitten *et al.* (1987).

302. Torresian Imperial-pigeon

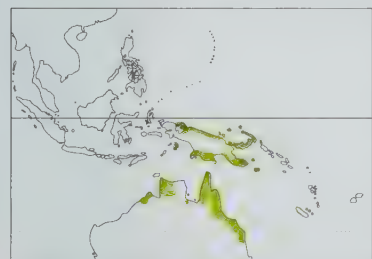
Ducula spilorrhoa

French: Carpophage argenté **German:** Kaiserfruchttaube **Spanish:** *Dúcula Australiana*
Other common names: (White) Nutmeg Pigeon, Australian Pied Imperial-pigeon, Torres Strait Pigeon

Taxonomy. *Carpophaga spilorrhoa* G. R. Gray, 1858, Aru Islands. Forms a distinctive superspecies with *D. bicolor* and *D. luctuosa*; species limits in this group are unclear, and all three sometimes considered conspecific; other authors recognize up to five species; further study required. Race *subflavescens* sometimes considered a distinct species. Proposed races *melvillensis* and *tarara* intergrade with nominate; status of the form *constans* (Kimberley region of NW Australia) is unclear, and this population provisionally retained in nominate, pending further work. Two subspecies currently recognized.

Subspecies and Distribution.

D. s. subflavescens (Finsch, 1886) - Bismarck Archipelago and Admiralty Is.
D. s. spilorrhoa (G. R. Gray, 1858) - Aru Is through coastal New Guinea (penetrating into interior along some major rivers) and islands in Geelvink Bay to D'Entrecasteaux, Trobriand and Woodlark Is, and Louisiade Archipelago, then S to N & NE Australia (from Kimberley region and NW Northern Territory to N & C Cape York Peninsula, and S down E coast to Aquila I, near Carmila).



Descriptive notes. 38-44 cm; 450-550 g. General plumage white, usually with creamy white or grey suffusion, especially on head and neck; outwings and secondaries black, with silver-grey tinge in fresh plumage (visible only at close range); uppertail white with broad black tip and narrow black edges; black spots on rear flanks grading to black bars on lateral undertail coverts; undertail white, narrowly edged black; bill yellow or yellow-green; legs and feet blue-grey. Sexes alike. Juvenile similar to adult, but with stronger grey tinge to head, neck and upperparts, and narrow buff tips to all feathers (soon lost through wear); underparts washed

pale buff; no black spotting on flanks; undertail-coverts buff with diffuse dark mottling on basal coverts; black tip of tail does not extend to outermost rectrix; outer greater primary underwing-coverts strongly tinged grey. Race *subflavescens* has white plumage strongly tinged creamy yellow. **Habitat.** Found in a variety of forested habitats, including *Eucalyptus*, *Melaleuca* and mangrove forests, as well as low scrub on small islands. Prefers foraging at forest edge, in swamp forest or in littoral forest, rather than in the interior of large areas of rain forest. Often breeds in colonies on small islands, either in mangroves or in rain forest; also breeds in scattered pairs in open or monsoon forest on mainland Australia and New Guinea. Usually only in lowlands, but up to 900 m on New Britain.

Food and Feeding. Frugivorous, feeding on fruit of a variety of trees, vines and shrubs. Diet well studied in Queensland and S New Guinea: birds in both areas had varied diets, with considerable differences in importance of plant families; laurels (Lauraceae) were most important element in diet of Australian birds, which also fed on Oleaceae, Burseraceae, Moraceae, Arecaceae, Solanaceae, Myristicaceae and Pandanaceae; New Guinea birds fed mainly on figs (Moraceae) and Annonaceae; other fruits taken included members of the families Ulmaceae, Rosaceae, Arecaceae and Combretaceae.

Breeding. Breeding more seasonal than in most tropical pigeons: in Queensland, season extends late Aug to Jan, with pronounced peak of egg-laying in Sept. Often nests in dense colonies on offshore islands, some of which may formerly have numbered over 100,000 birds. Nests in colonies on mangrove islands are relatively substantial, comprising green mangrove shoots; typically placed in fork 1-5 m above the ground, but may also be on the ground, or in abandoned nest of conspecifics or other species. Lays 1 glossy white egg; incubation 26-28 days, male and female taking turns on alternate days; hatchling weighs 16.5-21.5 g, and is covered with yellowish down; remiges appear at 4 days and rectrices at 7 days; chick leaves nest at c. 23 days, when almost fully feathered except on throat; moult into adult plumage begins at c. 140 days and is complete after c. 200 days (information based on captive birds with some corroborating field data). Pairs may sometimes fledge 2 or even 3 nestlings in a single season.

Movements. As far as is known, most populations sedentary. Australian population generally migratory, spending non-breeding season in New Guinea (confirmed records from R Bec, Irian Jaya, E to the E side of the Gulf of Papua, Papua New Guinea) and arriving at Cape York Peninsula in late Jul, reaching breeding colonies in Queensland by mid-Aug; return migration begins Jan, but main movement in Feb or early Mar; a few birds are resident on the breeding grounds. Migrates in flocks, usually of 50-100 birds, flying up to 20 m above the water, and a few kilometres offshore; migration appears to continue day and night. Vagrant to Lord Howe I. Birds fly daily from offshore breeding colonies to foraging areas on adjacent mainland; a highly mobile species with strong, direct flight.

Status and Conservation. Not globally threatened. Species remains common in New Guinea; also in N Queensland, where total number of nesting colonies along the coast was estimated as 166 in 1990; of these, 9 colonies numbered over 10,000 breeding pairs each. However, colonies south of Cairns have declined markedly and the species has disappeared from many areas due to excessive hunting at nesting colonies and destruction of foraging habitat on the mainland. In some Great Barrier Reef colonies, disturbance due to tourism may be causing declines.

Bibliography. Andrew (1992), Atherton & Greeves (1985), Bahr (1995), Beehler *et al.* (1986), Bell (1967), Blakers *et al.* (1984), Bruce (1989), Campbell & Barnard (1917), Christidis & Boles (1994), Coates (1985), Coleman (1981), Crome (1975a, 1975c), Dell (1978), Diamond (1975c), Frith (1982), Frith, Crome & Wolfe (1976), Gibson (1984), Healey (1992), Higgins & Davies (1996), Johnstone (1981), King, B.R. (1990), Mayr & Rand (1937), McAllan *et al.* (1994), Mees (1982a), Peckover & Filewood (1976), Rand (1942a), Rand & Gilliard (1967), Thorsborne *et al.* (1988), Walker (1986), Winter (1994).

303. White Imperial-pigeon

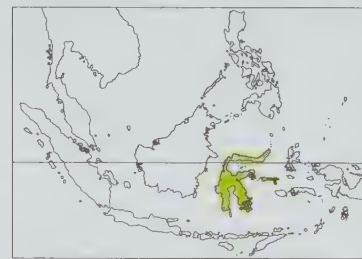
Ducula luctuosa

French: Carpophage luctuose **German:** Elsterfruchttaube **Spanish:** *Dúcula Luctuosa*
Other common names: Sulawesi Pied/Celebes Pied/Silver-tipped Imperial-pigeon, Nutmeg Pigeon, White Fruit-pigeon

Taxonomy. *Columba luctuosa* Temminck, 1825, Sulawesi. Forms a distinctive superspecies with *D. bicolor* and *D. spilorrhoa*; species limits in this group are unclear, and all three sometimes considered conspecific; other authors recognize up to five species;

further study required. Range apparently overlaps with that of *D. bicolor* in N & C Sulawesi (e.g. Gorontalo, Bumbulan), where the two are segregated by habitat preferences. Monotypic.

Distribution. Sulawesi and islands off NE (Manadotua, Manterawu, Talisei, Bangka, Lembeh) and SE (Muna, Labuan Blanda, Butung) to Banggai and Sula Is.



Descriptive notes. 37-48 cm; 410 g. General body plumage white; flight-feathers silvery grey, edged black; many feathers of tibial and ventral regions are largely black, giving smudged or mottled appearance. Sexes alike. Juvenile presumably as in allied species, greyer, with buff feather fringes.

Habitat. Open woodland, forest edge and cultivated areas in lowlands, up to 475 m; sometimes roosts in mangroves. Apparently less restricted to coastal and small-island habitats than *D. bicolor*, e.g. at Morowali, C Sulawesi, latter is common on small offshore islands whilst present species occurs in lowland areas

on the mainland.

Food and Feeding. No information available on diet, which is assumed to be similar to those of *D. bicolor* and *D. spilorrhoa*. Usually occurs in flocks of 5-20 birds.

Breeding. Little information. Breeding reported in Sept on Butung, and Oct on Muna.

Movements. No information.

Status and Conservation. Not globally threatened. Poorly known. Species reported to be widespread and generally uncommon in Sulawesi, though can be locally or seasonally common; common in Dumoga-Bone National Park, N Sulawesi. Also common on Taliabu (Sula Is), where large groups form prior to dusk in heavily degraded forest.

Bibliography. Andrew (1992), Andrew & Holmes (1990), Bishop (1992), Christidis & Boles (1994), Coates & Bishop (1997), Davidson *et al.* (1995), Gibbs (1990), Holmes & Philipps (1996), Johnstone (1981), McKean (1982), Rozendaal & Dekker (1989), Stresemann (1941), Sujatnika *et al.* (1995), Watling (1983), White & Bruce (1986), Whitten *et al.* (1987).

Genus *LOPHOLAIMUS* Gould, 1841

304. Topknot Pigeon

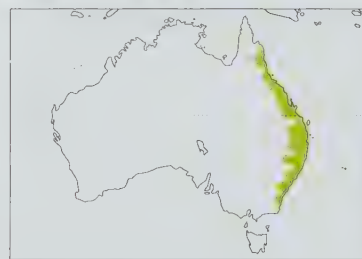
Lopholaimus antarcticus

French: Carpophage à double huppe **German:** Haubenfruchttaube **Spanish:** Paloma Bicrestada
Other common names: Flock Pigeon, Quook Quook

Taxonomy. *Columba Antarctica* Shaw, 1794, New South Wales.

A distinctive monotypic genus of uncertain affinities; perhaps most closely related to *Hemiphaga*, as both of these genera have only 12 tail feathers, while cere is feathered dorsally. Monotypic.

Distribution. E Australia, from SE Cape York (Cooktown area) to southernmost New South Wales in coastal lowlands and adjacent highlands and plateaux.



Descriptive notes. 40-45 cm; 475-600 g. A large pigeon with a broad, rather long tail; feathers of forecrown elongated, forming distinctive forecrest curling up from bill and swept back over crown; feathers of rear crown also elongated, forming long second crest, drooping over nape and hindneck; forecrown feathers grey, hindcrown feathers rufous bordered with black; rest of head, neck and underparts grey, with lanceolate feathers of upper breast giving spiky appearance; upper body and wings slate grey, slightly paler on rump and uppertail-coverts, with darker fringes to secondary-coverts, tertials and most upper body feathers; tail

grey-black, with conspicuous silvery grey subterminal band; orbital skin pink or red, bill pink or rosy, paler at tip, grey at base; legs pink to purplish red. Sexes alike, but crests of female smaller and forecrest paler. Juvenile has smaller crests and so lacks the distinctive head shape of adult; forehead, crown and nape brown, forming a cap that extends to level of eye; feathers of upperparts have pale, not dark, fringes, giving a scaled appearance; bill reddish brown, gradually acquiring adult coloration.

Habitat. Rain forest in tropical, subtropical and temperate zone; closed, wet sclerophyll forest; sometimes tall open sclerophyll forest, coastal *Melaleuca* forest and cleared agricultural areas. Nests only in rain forest or adjacent drier forests; tends to roost in emergent canopy trees or tall trees on ridgetops.

Food and Feeding. Frugivorous, feeding on a variety of fruits and berries 5-25 mm in diameter. Important food plant families include Arecaceae, Lauraceae, Moraceae, Rutaceae and Myrtaceae; many other families are also used; most feeding is in native species, but the introduced camphor laurel (*Cinnamomum camphora*, Lauraceae) is also favoured. Most feeding is in the upper canopy, but birds will visit understorey and small trees in open country if food is scarce elsewhere. Feeding is active, birds clambering among branches and hanging upside-down to reach fruit; feeding flocks can often be located by the sound of flapping wings and falling fruit.

Breeding. Appears to peak in local spring and early summer, but may occur over a long period; nests with eggs in Jun, Aug, Oct, Nov and Dec. Solitary nester. Most nests high in trees at least 15-30 m above ground, though can be as low as 2-5 m up; nest can be quite substantial, up to 250 mm in diameter and 50-70 mm thick, though some nests are flimsy; in one captive pair, all nest material was collected by the male and brought to the nest site where the female arranged it. Lays 1 white egg; one wild chick left the nest at c. 17 days. In captivity: incubation 22-24 days, by both sexes; fledging 22-26 days. At hatching, chick naked and weighs 18-22 g; primaries and secondaries begin to erupt by 7 days; wings fully feathered by 14 days; almost all feathers, except on throat, fully emerged by 21 days; by 27 days, weight up to c. 282 g, and chick fully feathered, including short reddish crest feathers; juvenile moult begins at c. 100 days; at completion of juvenile moult, crest is fully formed, though small.

Movements. A nomadic, flocking species that moves over great distances in response to food availability; local increases in number are fairly predictable, based on phenology of food plants; upon arrival in an area, the flocks move restlessly, but soon settle into a pattern of direct flights between established roosting and feeding areas; flocks do not break up in the breeding season, but become less cohesive.

Status and Conservation. Not globally threatened. Numbers of present species much reduced due to habitat destruction and hunting; protection of remaining rain-forest habitat across the range of this nomadic species is needed. In New South Wales, total population is estimated to be over 70,000 birds.

Bibliography. Blakers *et al.* (1984), Crome (1975a), Date *et al.* (1991), Fingland (1997), Frith (1952a, 1957, 1982), Gilbert (1936), Gogerley (1925), Higgins & Davies (1996), Innis (1989), Lindsey, T.R. (1992), Macdonald (1988), Pizzey & Doyle (1980), Rutgers & Norris (1970), Schodde & Tidemann (1986), Simpson & Day (1996), Tronson & Tronson (1987), Watson (1992).

Genus *HEMIPHAGA* Bonaparte, 1854

305. New Zealand Pigeon

Hemiphaga novaeseelandiae

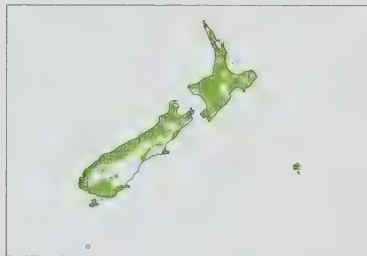
French: Carpophage de Nouvelle-Zélande **German:** Maorifruchttaube **Spanish:** Paloma Maori
Other common names: New Zealand Fruit-pigeon, Native Pigeon; Kereru (*novaeseelandiae*); Parea (*chathamensis*)

Taxonomy. *Columba novae Seelandiae* J. F. Gmelin, 1789, South Island, New Zealand. A distinctive genus of uncertain affinities, perhaps allied with *Lopholaimus* which also has only 12 tail feathers, and cere feathered dorsally; more distantly allied with *Ducula*. Recent work suggests that the three races may more appropriately be considered separate species. Race *spadicea* of Norfolk I extinct. Two extant subspecies currently recognized.

Subspecies and Distribution.

H. n. novaeseelandiae (J. F. Gmelin, 1789) - New Zealand, including larger offshore islands.

H. n. chathamensis (Rothschild, 1891) - Chatham Is.



Descriptive notes. 46-50 cm; 600-800 g. Large, brightly coloured fruit pigeon; most of upperparts iridescent dark green, with purple and bronzy highlights on breast and mantle; lower back paler iridescent grey-green, with slight silvery grey tinge on rump, uppertail-coverts and bases of primaries, these paler areas prominent in flight; dark breast sharply demarcated from white of rest of underparts; narrow white band between dark breast and dark folded wing; undertail silvery grey, with broad dark brown subterminal band; bill red, slightly paler near tip; legs dark red. Sexes alike. Juvenile resembles adult but plumage

and bare part colours duller. Race *chathamensis* larger, with much heavier, longer bill; dark plumage duller overall; rump grey; breast darker with more purple iridescence; undertail-coverts dark; tail mainly blue and purple; primary-coverts much greyer; wing-linings mostly white. Extinct race *spadicea* had distinctive chestnut mantle, clearly demarcated from coppery green hindneck, and combination of white undertail-coverts and underwing-coverts.

Habitat. Prefers to feed in mixed podocarp-broadleaf forests, with complex structure and high plant diversity; favoured habitat is native forests in the lowlands, but sometimes occurs up to 1100 m; numbers in logged forest significantly lower than in unlogged forest. Also occurs in parks, gardens and plantings of exotic trees.

Food and Feeding. Primarily frugivorous; also feeds on leaves, shoots, flowers and buds. Wide variety of plants exploited, including both native and exotic species: important fruit sources for nominate race include *Prumnopitys* and *Podocarpus* (Podocarpaceae), *Coprosma* (Rubiaceae) and *Sambucus* (Caprifoliaceae), whereas important foliage food plants include *Laburnum* and *Sophora* (Fabaceae), *Prunus* (Rosaceae) and *Populus* (Salicaceae); important fruit sources for race *chathamensis* are *Myrsine* (Myrsinaceae) and *Pseudopanax* (Araliaceae), while important foliage sources include *Trifolium* (Papilionaceae), *Stellaria* (Caryophyllaceae) and *Hydrocotyle* (Umbelliferae). In general, feeds mostly or exclusively on fruit during summer and autumn, then mostly on foliage through winter and spring. Most feeding is in the upper understorey (59% of foraging time); less in canopy (19%) and lower understorey (17%); least on ground (6%). Usually feeds alone or in pairs, though loose flocks will form at abundant food sources; single birds and pairs defend feeding territories in winter, sometimes for long periods, but these break down over summer.

Breeding. Eggs from Jun to early Oct in Chatham Is. Pair-bond probably lasts for more than one season; pairs associate in non-breeding season. Pairs maintain well defined home ranges of up to 10 ha; area near nest-tree defended; same home range is used each year, or new one established close to previous sites; some pairs remain within breeding range all year round. Nest is frail platform of twigs with a shallow unlined bowl. Lays 1 white egg; incubation 28-30 days (26-28 days in *chathamensis*); fledging 36-45 days; both sexes build nest, incubate, brood and feed young; female incubates from late afternoon through night; male from morning through to late afternoon. Eyes open when chick is at least 7 days old; feathered at 24 days. In a study of 45 nests over 7 seasons, 33% hatched young, and 22% fledged young; most failures were due to predation, particularly by introduced black rats (*Rattus rattus*).

Movements. Sedentary, but with significant local movements: in a radio-tracking study of 54 birds, maximum recorded movement between spring feeding areas and summer range was 25 km; seasonal ranges appeared to be traditional, though timing of movements dependent on breeding success and fruit phenology. Numbers in native forest tend to be lowest in late winter and spring, when influxes to farms, riparian areas and suburban gardens occur. Flights over sea between islands have been recorded.

Status and Conservation. Not globally threatened. Populations of nominate appear to be fairly stable, although they declined following European settlement, due to hunting and forest clearing; avidly hunted by both Maoris and Europeans until granted protected status in 1921; current threats include habitat loss, illegal hunting, and introduced predators and competitors, including feral cats,

rats, stoats (*Mustula erminea*), brush-tailed possums (*Trichosurus vulpecula*), Common Mynas (*Acridotheres tristis*) and Australian Magpies (*Gymnorhina tibicen*). Race *chathamensis* is endangered, with recent population estimates of slightly over 100 birds, following estimate of under 50 birds in 1990. Once abundant on Chatham, Pitt and Mangere Is; now extinct on Pitt; decline noted in 1930's, due to hunting, habitat degradation and predation by introduced mammals (cats, possums); populations have increased since predator control was undertaken. Race *spadicea* was first recorded in 1774, when Norfolk I was discovered; declined due to hunting by settlers and perhaps predation by feral cats; still survived in 1830's; there have been no records since 1900. A large fruit-pigeon found by early settlers on Raoul I (Kermadec Is) quickly became extinct in mid-19th century, due to hunting and predation by feral cats. No specimens exist and its taxonomy is unclear, but it may have represented a form of *H. novaeseelandiae*.

Bibliography. Baker (1992), Bell (1980), Bettesworth (1981), Blanchard (1992), Chambers (1989), Clout (1990), Clout, Denyer *et al.* (1995), Clout, Gaze & Hay (1988), Clout, Gaze, Hay & Karl (1986), Clout, Karl & Gaze (1991), Clout, Karl, Pierce & Robertson (1995), Devonshire (1980), Ellis (1975), Falla *et al.* (1981), Freeman (1994), Garnett (1993), Genet & Guest (1976), Gibb (1970), Grant (1990), Grant *et al.* (1997), Greenway, J.C. (1967), Hadden (1993), Higgins & Davies (1996), James & Clout (1996), Johnstone (1985), King (1978/79), Langham (1991), McEwan (1978), Morris (1979a, 1979b), Morrison (1959), Nilsson *et al.* (1994), Onley (1980, 1983), Pearson & Climo (1993), Pierce & Graham (1995), Powlesland *et al.* (1997), Robertson (1985), Schodde *et al.* (1983), Sibson (1982), Soper (1976), St. Paul (1977), Tisdall (1992), Williams (1975).

Genus *CRYPTOPHAPS* Salvadori, 1893

306. Sombre Pigeon

Cryptophaps poecilorrhoa

French: Carpophage des Célèbes

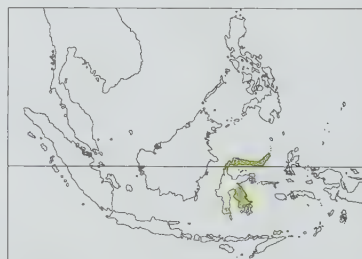
Spanish: Paloma Culpinta

German: Fleckenbauch-Fruchttaube

Other common names: Celebes Dusky Pigeon, Celebes/Rusty-bellied Fruit-dove/Fruit-pigeon/Pigeon, Long-tailed Imperial-pigeon

Taxonomy. *Carpophaga poecilorrhoa* Brüggemann, 1876, Minahassa, Sulawesi. Affinities uncertain; apparently close to *Gymnophaps* and possibly also to *Ducula*; alternatively may be related to the cuckoo-dove assemblage (*Macropygia*/Turacoen/Reinwardtoena). Monotypic.

Distribution. Mountains of N, S & SE Sulawesi.



Descriptive notes. c. 46 cm. Head, neck and breast grey, paler on forehead and lower breast, and darker towards mantle; some birds have purplish tinge to grey areas; mantle, back, rump, uppertail-coverts and wings blackish olive with buff edges to feathers when new, and faint bronzy green gloss; belly pale brown, flanks darker brown with buff-edged feathers giving mottled effect; undertail-coverts black, edged creamy buff; underwing black with central chestnut patch; tail black narrowly tipped buffy white; bill bluish grey with purple base, orbital skin and iris red, legs and feet red to purplish red. Female has grey areas noticeably

suffused with dull pink; some birds have clear brown fringes to breast feathers.

Habitat. Undisturbed humid primeval hill and mountain forests, where tends to perch quietly in subcanopy; recorded at altitudes of 950-2300 m, with highest records in Lore Lindu National Park (NC Sulawesi).

Food and Feeding. Known to feed on palm fruits; also takes hard fruits of rattan (*Calamus*), which may prove to be major component of diet. Usually observed alone, less often in pairs.

Breeding. No information available.

Movements. No information available. Flight described as similar to that of a cuckoo-dove (*Macropygia*).

Status and Conservation. Not globally threatened. Currently considered near-threatened. No precise data available, but species described as being generally widespread though uncommon; uncommon in Dumoga-Bone National Park (Minahassa Peninsula) in 1980's. Shy, retiring and inconspicuous, and easily overlooked, even when specifically searched for, all the more so because its vocalizations remain unknown. Extensive research required; also surveys, in order to establish population sizes and trends, and identify possible threats.

Bibliography. Andrew (1992), Coates & Bishop (1997), Holmes & Philipps (1996), McKean (1982), Rösler (1996), Rozendaal & Dekker (1989), Stresemann (1941), Sujatnika *et al.* (1995), Watling (1983), White & Bruce (1986).

Genus *GYMNOPHAPS* Salvadori, 1874

307. Papuan Mountain-pigeon

Gymnophaps albertisii

French: Carpophage d'Albertis

German: Albertistaube

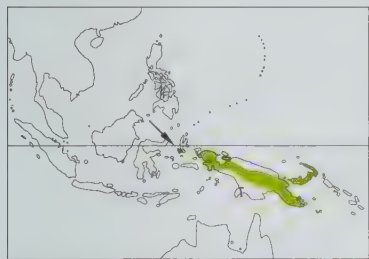
Spanish: Paloma Montana Papú

Other common names: Carmine-faced/Bare-eyed/D'Albertis's Mountain-pigeon, Bare-eyed Pigeon(!)

Taxonomy. *Gymnophaps albertisii* Salvadori, 1874, Andai, New Guinea. Relationships of genus uncertain; somewhat similar to some *Ducula* in colour and colour-patterns. Present species forms a superspecies with *G. mada* and *G. solomonensis*. Two subspecies recognized.

Subspecies and Distribution. *G. a. exsul* (Hartert, 1903) - Bacan (NC Moluccas).

G. a. albertisii Salvadori, 1874 - Yapen I, mountains of New Guinea, New Britain and New Ireland, and Goodenough I.



Descriptive notes. 33-36 cm; 259 g. Head and sides of neck dark grey; upperparts dark grey with a silvery green sheen; back and wing-covert feathers edged black, giving scaly appearance; underwing dark grey; narrow grey terminal band on tail; ear-coverts, throat and belly dark purplish chestnut; lower neck to lower breast pinkish cream; thighs and undertail-coverts grey; iris red with an internal orange, yellow or greenish ring; orbital skin expanded, bright red; bill reddish with red cere and pinkish tip; feet and legs red, purplish red or dark pink. Female often has breast suffused with grey, and feathers of throat edged grey.

Juvenile duller overall, dull brown breast, pale creamy rufous underparts; forehead chestnut; innermost secondaries edged chestnut. Race *exsul* darker and slightly larger than nominate.

Habitat. Primary forest from sea-level up to 3350 m or higher. Principally in hills and mountains, but may visit nearby lowlands and occasionally common down to sea-level. Race *exsul* of Bacan largely or completely restricted to montane forest, where recorded at 900-1500 m.

Food and Feeding. Takes fruit, including figs and drupes of the laurel *Cryptocarpa tessalata*. Forages in the canopy; occurs in flocks of 10-40 and even up to 80 birds, but also sometimes in twos and threes.

Breeding. Male with enlarged gonads in Jun. Nest is a platform of sticks placed 3-7.5 m up in a small tree; one ground nest in a depression in short dry grass was found above tree-line; species apparently nests in low, sheltered places early in the wet season, but in high, relatively exposed sites towards end of the wet season. Lays 1 egg.

Movements. Partly nomadic. In Schrader Mts (EC New Guinea), large numbers have been seen visiting beech forests during the rainy season Oct/Nov-Mar. May move to lower altitudes to forage. Occasionally seen to drop hundreds of metres down the slopes of steep ridges in a single dive.

Status and Conservation. Not globally threatened. In Papua New Guinea species is widely but erratically distributed in E highlands, and locally and seasonally abundant in NE highlands. Apparently very common in lowland forest and second growth on New Britain; however, only a single flock of 15 birds was recorded during 12 days of fieldwork on New Ireland in Feb 1976. Race *exsul* of Bacan thought to be uncommon, though current status essentially unknown.

Bibliography. Andrew (1992), Bailey (1992a), Beehler (1978a, 1978b), Beehler *et al.* (1986), Bishop (1983), Clapp (1979b, 1987a), Coates (1985), Coates & Bishop (1997), Diamond (1972a), Gilliard & LeCroy (1961, 1967a), Goodwin (1963a), Gregory (1995a, 1995b), Majnep & Bulmer (1977), Mayr & Rand (1937), Rand & Gilliard (1967), Ripley (1964), Rösler (1996), Schmid (1993), Schodde *et al.* (1975), Smith, J.M.B. (1976), White & Bruce (1986).

308. Long-tailed Mountain-pigeon

Gymnophaps mada

French: Carpophage mada **German:** Madataube **Spanish:** Paloma Montana Moluqueña

Taxonomy. *Columba mada* Hartert, 1899, Mt Mada, c. 900 m, Buru.

Relationships of genus uncertain; somewhat similar to some *Ducula* in colour and colour-patterns. Present species forms a superspecies with *G. albertisii* and *G. solomonensis*. Two subspecies recognized.

Subspecies and Distribution.

G. m. mada (Hartert, 1899) - Buru.

G. m. stalker (Ogilvie-Grant, 1911) - Seram.

Descriptive notes. 33-38.5 cm. Crown, nape and hindneck bluish grey, becoming darker grey on mantle; upperparts dark slaty, slightly glossy; mantle, back and rump feathers with narrow black subterminal borders and broad silver-grey fringes, which are easily worn off; remiges and rectrices greenish black; outer sides of primaries and ends of rectrices narrowly fringed pale; face, throat and upper breast white to pale buffish pink, merging to buffy pink on belly; tibial feathers light buff; iris grey, pale brown or yellow with outer ring of orange or red; orbital skin wide, bright red; feet and legs purple, purplish red or brownish red. Female has orbital skin and cere dark blackish red. Juve-



nile duller with dusky breast and pale rufous underparts. Race *stalker* has deep buffish pink face and breast, merging to darker vinous pink on the underparts; thighs grey, undertail-coverts deeper chestnut; orbital skin purplish red.

Habitat. Occurs mainly in hill and montane forests; sometimes lower down, and occasionally visits disturbed forests in lowlands in order to feed. On Buru, found from sea-level up to 2060 m, but most records are above 700 m; on Seram, recorded at c. 400-2250 m, but usually above 1200 m.

Food and Feeding. Virtually nothing known. Probably takes fruits and berries like conge-

ners, but only published information relates to its visiting fruiting trees on the coast. Usually occurs alone, in pairs or in flocks of up to 20 birds.

Breeding. No information available. As with other montane species on Seram, breeding season is probably largely over by mid-Aug.

Movements. Sometimes descends to coastal lowlands to feed; however, movement patterns not well understood.

Status and Conservation. Not globally threatened. Currently considered near-threatened. Very poorly known, but species is reported to be moderately common on both islands; on Seram, recent work indicates that it is fairly common in Manusela National Park. Extensive research required.

Bibliography. Andrew (1992), Bowler & Taylor (1989, 1993), Coates & Bishop (1997), Gibbs (1990), Jepson (1993), Marsden *et al.* (1997), Rösler (1996), Siebers (1930), Stressemann (1914), Sujatnika *et al.* (1995), White & Bruce (1986).

309. Pale Mountain-pigeon

Gymnophaps solomonensis

French: Carpophage des Salomon

Spanish: Paloma Montana de las Salomón

German: Malaitataube

Taxonomy. *Gymnophaps solomonensis* Mayr, 1931, Malaita, Solomon Islands.

Relationships of genus uncertain; somewhat similar to some *Ducula* in colour and colour-patterns. Present species forms a superspecies with *G. albertisii* and *G. mada*. Monotypic.

Distribution. Mountainous areas in Solomon Is, from Bougainville to Guadalcanal and Malaita.



Descriptive notes. 38 cm; 310-385 g. Head and neck whitish grey, lighter on throat and upper breast; lower breast and belly buffy pink; vent and undertail-coverts pale grey; mantle, back and wing-coverts silver-grey, tinged green and edged with black; primaries and secondaries black, a green silvery tinge evident on closed wing; bill yellow basally, yellowish or pale brown distally, edge of mandibles and nostril region purplish pink-tinged; iris orange to reddish; orbital skin red or purplish; legs and feet purplish. Sexes alike. Juvenile has blue-grey iris.

Habitat. Montane forests, mainly at 750-1950 m, but recorded at 100-940 m on Kolombangara. Usually observed in the crowns of trees.

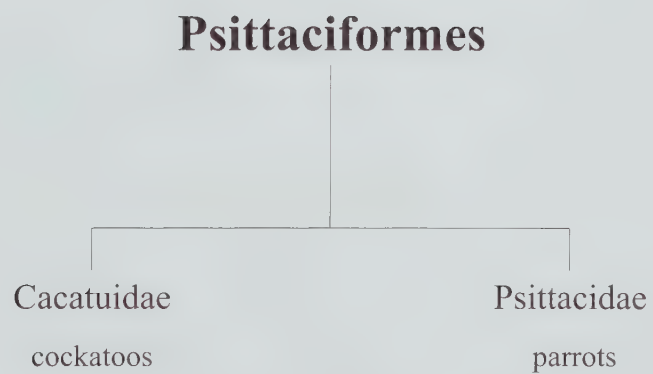
Food and Feeding. Virtually unknown. Observed eating small-seeded fruit. Flocks of up to 25 individuals regularly seen, and a flock of c. 100 birds has been recorded.

Breeding. Virtually no information; 4 of 5 birds collected in Jul-Sept were in breeding condition. **Movements.** No information.

Status and Conservation. Not globally threatened. Virtually no information available on current status, but species is reported to be moderately common on Kolombangara. Recorded just once during fieldwork on Guadalcanal in 1990. Extensive research and survey work required.

Bibliography. Buckingham *et al.* (1995), Cain & Galbraith (1956), Coates (1985), Dahl (1986), Diamond (1975a, 1975c), Galbraith & Galbraith (1962), Hadden (1981), Mayr (1945b), Rösler (1996), Schodde (1977).

Order PSITTACIFORMES



Class AVES
Order PSITTACIFORMES
Family CACATUIDAE (COCKATOOS)



- Large to medium-sized parrots, with massive bill and medium to longish tail; crest well developed in many species.
- 30-65 cm.



- Australasia.
- Variable habitats, from moist forest to dry shrubland.
- 6 genera, 21 species, 44 taxa.
- 7 species threatened; none extinct since 1600.

Systematics

The recent finding of a fossil cockatoo from the early to middle Miocene, at Riversleigh, north-west Queensland, provides the oldest fossil record for the order Psittaciformes in Australia, and for the Cacatuidae in the world. It confirms that the parrots are of ancient origin, with Australia as a centre of evolution and radiation. The restricted centre of diversity in the Australian region shown by the cockatoo family further supports this idea.

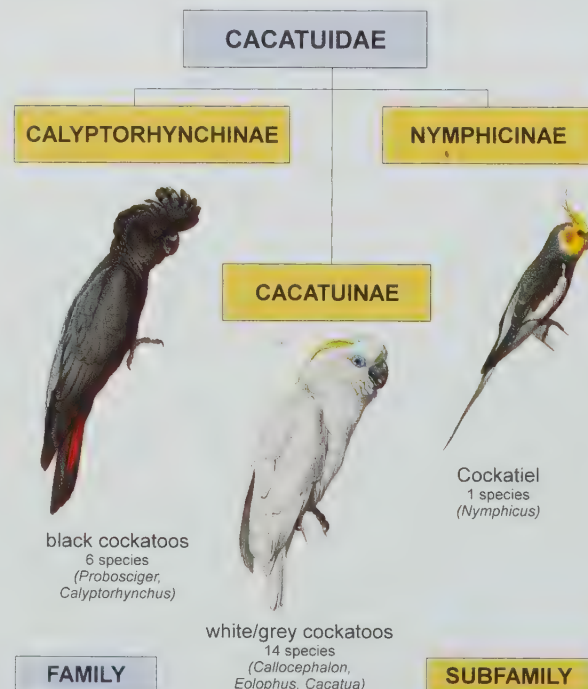
The order Psittaciformes is a distinct group of birds which show large, hooked bills, zygodactyl feet, and a characteristic looping of the intestines, while they lack caeca; a parent feeds its young by holding the bill of the altricial nestling inside its own. Because these characters are shared throughout the order, further subdivision has been difficult and has resulted in a succession of different taxonomic arrangements, depending on which features a worker was considering. Initially these divisions were based on external morphology; they were modified as the physiology, the pathways of the blood supply, and the anatomy of the skull were examined in turn; then behaviour, in the way that different species scratched their heads and the nature of their vocalizations, was held to be significant. More recently, biochemical studies of egg-white proteins, DNA hybridization and variation in DNA sequences have helped to standardize the systematic arrangement to a certain extent.

Analysis of all these characters points to the cockatoos being a clearly separate grouping deserving family status as one of two, possibly three, distinctive lineages within the Psittaciformes. Cockatoos are distinguished from other parrots by the presence of a gall bladder; the position of their carotid arteries; the absence of blue or green colours in their plumage, due to the lack of Dyck texture in their feathering; the shape of the skull, with a fully ossified orbital ring and bridged temporal fossa; the crest, which is usually spectacularly erectile; and their downy hatchlings. Recent biochemical and chromosomal studies support recognition of a separate cockatoo family.

The 21 species of cockatoo are placed in six separate genera, and this is regarded by many workers as sufficient subdivision of the family. Others prefer to subdivide the family into subfamilies or tribes, largely on the basis of colour: the Calyptorhynchinae (*Probosciger*, *Calyptorhynchus*) are black; and the Cacatuinae (*Callocephalon*, *Eolophus*, *Cacatua*) are mostly white or grey; while the Nymphicinae (*Nymphicus*) are distinct in several aspects. The Cockatiel (*Nymphicus hollandicus*) is quite different from other cockatoos, and for many years its taxonomic position was considered uncertain because

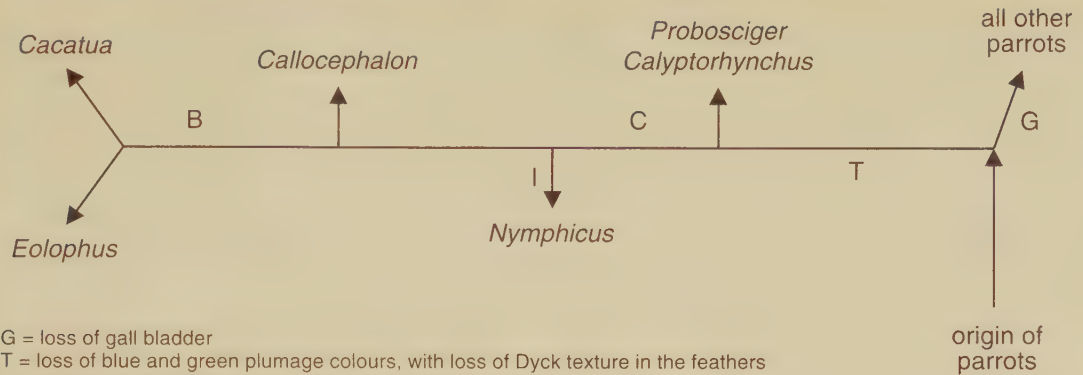
it is much smaller and multi-coloured, and the sexes have distinctly different plumages. However, it does have the artery arrangement, feather colour limitation, and downy hatchlings typical of the family, so it is commonly placed in a subfamily or tribe of its own within the cockatoos, a verdict supported by recent biochemical investigations.

For the non-specialist, the division into six genera best describes the family, an arrangement further supported by the different chromosome numbers of five of them: *Cacatua* 82; *Calyptorhynchus* 78; *Eolophus* 76; *Probosciger* 74; and *Nymphicus* 72. The Palm Cockatoo (*Probosciger aterrimus*) of New Guinea and the north-eastern tip of Australia is the largest and most spectacular of all the cockatoos, and it is rather different from the other five black cockatoos, all of which are placed in the genus *Calyptorhynchus*. The taxonomy of the two grey cockatoos has evoked much discussion. There is little similarity in their ecology or general behaviour, with one, the Gang-gang Cockatoo (*Callocephalon fimbriatum*), clearly sexually dimor-



Subdivision of the
Cacatuidae

[Figure: Ian Lewington]



A comprehensive review of the parrots by G. A. Smith suggested that certain evolutionary steps may have taken place. Figure modified from Smith (1975).

G = loss of gall bladder
T = loss of blue and green plumage colours, with loss of Dyck texture in the feathers
C = loss of courtship feeding and start of shared incubation
I = start of scratching the head over the lowered wing
B = loss of feather barring

phic, while the other, the Galah (*Eolophus roseicapillus*), is not. The Galah has sometimes been placed in the genus *Cacatua* with the white cockatoos, but recent biochemical studies support the validity of *Eolophus* as a separate monotypic genus. The 12 white cockatoos are conveniently subdivided into those with small crests, the corellas, and those with large, expressively erect crests, the typical white cockatoos. The latter may be further subdivided into those with forward-curving crests (*leadbeateri*, *sulphurea*, *galerita*) and those with crests curving backwards (*ophthalmica*, *alba*, *moluccensis*).

Several of the first descriptions of cockatoos were based on illustrations in early journals and books and were not subject to rigorous examination by taxonomists with access to extensive museum collections. As a result of this, some confusion arose which has only recently been corrected. For example, the Long-billed Black-cockatoo (*Calyptorhynchus baudinii*) was first illustrated and described by Edward Lear in 1832, with the common name of "White-tailed (Black) Cockatoo". Eighty years later Gregory Mathews, assuming that Lear's specimen was a short-billed bird, named a specimen with a long bill as a new subspecies, *C. b. tenuirostris*. From field studies it became evident that a long-billed and a short-billed form existed, each with ecology and distribution sufficiently different for the two to be regarded as good species. It also became apparent that Mathews had been mistaken in thinking that Lear's specimen was a short-billed bird, since the illustration showed it to be long-billed, and so *C. b. tenuirostris* became a junior synonym of *C. baudinii*, while the Short-billed Black-cockatoo (*Calyptorhynchus latirostris*) received its current scientific name. Nevertheless, since then opinion has differed as to whether the short-billed form should be regarded as a race of the eastern Yellow-tailed Black-cockatoo (*Calyptorhynchus funereus*) or as a species in its own right; so far, biochemical analysis has not achieved a clear separation. In the meantime, for the convenience of most ornithologists, three separate species of white- and yellow-tailed black-cockatoos are commonly recognized in most recent taxonomic listings and field guides, although even now the difficulty of field identification between the Short-billed and the Long-billed causes problems, with the result that precise limits of their respective ranges within the area of overlap remain uncertain.

A second example of the early problems of taxonomists working on the other side of the world from where the birds lived was the naming of the Red-tailed Black-cockatoo (*Calyptorhynchus banksii*). Until 1988, the species was named *C. magnificus*, since Shaw's description pre-dated that of Latham's *banksii* by a few days. However, Shaw's description was based on an illustration that has since been identified as an immature Glossy Black-cockatoo (*Calyptorhynchus lathami*), and so the correct name for the Red-tailed Black-cockatoo is now recognized to be *C. banksii*.

A third example arose with confusion concerning the different Australian corellas, the Little (*Cacatua sanguinea*), the Long-billed (*Cacatua tenuirostris*) and the Western (*Cacatua pastinator*). For

many years they were regarded as forming just two species, the Little and the Long-billed, but careful analysis of a wide range of museum specimens and of detailed field studies has shown that there are two long-billed species, one eastern and one western, both of which evolved long, slender bills. It appears that these bills evolved in parallel on opposite sides of the continent, enabling each species to dig up the bulbous roots of particular, different, native plants when the soil was moist enough. This resource was especially valuable throughout the winter, when food is short for most cockatoos. Three species of corella are now generally recognized in Australia, although many field guides still retain old, in some cases erroneous, nomenclature.

Finally, the subspecific nomenclature of the Galah in Australia gave the eastern race nominate status because of an inadequate description of the location where the first specimen had been collected by Baudin's expedition in 1801, and the proposal by Mathews in 1912 of adopting New South Wales as the type locality. Examination of the type specimen in Paris showed that the bird was clearly of the western subspecies and must therefore have been collected in the Shark Bay area of Western Australia, the only place that Baudin's expedition could have encountered such birds. Thus the subspecific nomenclature had to be revised, with the western race becoming the nominate. This required a new type specimen of the eastern race to be collected and given a new subspecific name, which occurred in 1988.

In the past, the separation of subspecies was described as "largely a curatorial convenience". In contrast, a more recent definition describes them as "within a species, a named, recognized allopatric subpopulation which is (still) genetically compatible with other subpopulations, but is set apart by a concordant array of genetic or phenotypic characters". Then again, supporters of the phylogenetic species concept would do away with races altogether, promoting some to species and eliminating the others altogether. Be that as it may, these days the importance of conservation and the maintenance of genetic diversity has given a greater significance to subspecific determinations, since each race is regarded as a taxon in need of conservation assessment. This is particularly so where a species is widespread in its distribution over a continent the size of Australia and where each of the eight different states and territories has its own legislation and conservation measures. Recently, new collections, extensive examination of existing museum collections and thorough fieldwork have enabled a rationalization of the various subspecies of cockatoos that may usefully be accepted; this applies particularly to the Red-tailed, Glossy and Yellow-tailed Black-cockatoos, and to the corellas.

Morphological Aspects

Most cockatoos are large and in many ways comparable to the macaws of the Americas. The largest is the Palm Cockatoo, with



The large black cockatoos are notable for their erectile backward-sloping crests and their broad, variously coloured tail-bands, which are conspicuous as they alight and take wing, though not always when at rest. In the Red-tailed Black-cockatoo sexual dimorphism is pronounced. The mainly black male has a scarlet tail-band (almost entirely concealed here), while the female's is yellow-orange barred with black. Her head, neck and shoulders are liberally sprinkled with yellow spots and the breast feathers are edged with yellow. The broad, robust bill, dark grey in the male but bone-coloured in the female, is not only ideal for de-husking seeds and cracking hard nuts but also for shredding wood. A female of this species was the first Australian psittaciform to be sketched, on Cook's first voyage to the continent in 1770.

[*Calyptorhynchus banksii*, Australia.
Photo: Roland Seitre/Bios]

some individuals exceeding 1000 g, while at 90 g, the Cockatiel is the smallest. Cockatoos, like most other parrots, have short tarsi which tend to make walking a slow waddle, but they have powerful claws that enable them to move and feed through a tree canopy with great ease, sometimes using the bill as a third leg to reach another branch. Most species are strong fliers and often travel many kilometres in search of a favourite food source, but the speed at which they travel and their agility when flying as a flock vary. Galahs, corellas and Cockatiels have narrow wings and can fly fast, with speeds of up to 70 km/h recorded. The cohesion achieved when a flock is manoeuvring, both "for fun" and when avoiding predators, is a joy to watch. Most black cockatoos and Major Mitchell's Cockatoos (*Cacatua leadbeateri*) have more rounded wings and travel at a more leisurely pace; nevertheless they cover long distances from a nesting or roosting area to reach a current feeding ground.

Many species of bird that nest in the open tend to fledge their young as soon as possible, often before they can fly properly. However, cockatoos, nesting in the safety of tree-hollows, can afford to allow their young to take their time and to develop their wings fully before they leave the nest. In consequence, and despite the cramped conditions for wing exercise in the majority of hollows, most cockatoos fledge from the nest-hollow as competent fliers, even if they still have to learn about landing on branches and flying in a flock!

Cockatoos have large bills, which, if they did not have such narrow gapes, would be rather like those of birds of prey. However, when they are eating, the action of the bill and tongue are very different, and have been likened to the chewing action made by the jaws of ruminants. These specialized bills require regular maintenance, and resting birds hone the cutting edge at the front of the lower mandible by rasping it against the inner side of the hook on the upper mandible. That hook consists of laminated alternate bands of hard keratin, which when ground with the lower

mandible result in file-like surface known as the "filing-grooves". These filing-grooves are particularly important for seed-eaters that de-husk seeds before eating them. De-husking is achieved by squeezing the seed between the cutting edge of the lower mandible and the filing-grooves of the upper mandible, which prevent the seed from sliding to the rear.

The tongue is a very important part of a cockatoo because besides being a primary tactile organ, it is usually robust and muscular and is frequently used to clamp a seed to the roof of the upper mandible where it can be disintegrated by the action of the lower mandible. The tongue turns the seed until the cutting edge of the lower mandible locates a groove or seam in the seed, when a powerful bite splits the seedcoat. The tongue then turns the seed, takes out the kernel which is swallowed, and the empty husk is pushed forwards and discarded from the tip of the bill. Throughout this process, it is the lower mandible that exerts the strong pressure while the upper serves as an anvil. A full ring of bone around the eye socket must strengthen the weakness of the orbit when biting hard.

The bills of cockatoos vary considerably. The Palm Cockatoo has a large bill, exceeded in the Psittaciformes only by that of the Hyacinth Macaw (*Anodorhynchus hyacinthinus*). The bill of the Palm Cockatoo is unique in that for much of their length the upper and lower mandibles do not meet and the bicoloured tongue remains visible. The upper mandible has two step-like flat areas, providing surfaces on which seeds of different size are ground, and a third, outer level used for tearing larger fruits. This enables the birds to eat a wide variety of seeds, some as large and tough as *Pandanus* fruits, that require several blows from an axe to crack them. The other black cockatoos show a variety of bill shapes, some broad and deep to crack large capsules, others with a long upper mandible to dig insect larvae from trees or large seeds from within fruits or nuts. The Glossy Black-cockatoo is perhaps the most specialized, rarely eating anything

other than the cones of the different species of she-oak (*Allocasuarina*). Its upper mandible is deep and wide, matching the broad lower mandible. This enables the bird to rotate the cones so as to extract the small seeds, and to discard most of the cone while the tongue sorts and retains the seeds which are swallowed. Most of the other cockatoos have stout, general purpose bills but the Western and Eastern Long-billed Corellas have long, narrow upper mandibles with which they dig up bulbs and other underground plant storage organs.

As well as for flight, the feathers are extremely important in many ways for both thermoregulation and social display, so it is essential that the birds maintain them in excellent condition (see General Habits).

Moult in cockatoos is usually synchronized with the reproductive cycle, starting once the young are able to thermoregulate for themselves. The renewal of the entire wing is spread over several months, so that flight is little impaired throughout the period. The moult of body and tail feathers does not take so long. Wing moult starts with a central primary, usually the sixth followed by the fifth, and proceeds both outwards and inwards, following Hampe's Rule. The Galah averages 160 days to complete its wing moult; females average slightly quicker than males, taking some 155 days as opposed to about 165 days, but, since the males usually start earlier, both sexes tend to finish at the same time. Non-breeders start to moult a month earlier than breeders.

In aviary-reared Glossy Black-cockatoos, each rectrix was replaced every two years, with half of the tail feathers on either side being renewed in each moult, at random.

Habitat

Within Australasia cockatoos are found in nearly every available terrestrial habitat from the fringes of rain forest to arid shrubland in the deserts, to subalpine forest, and in the many forms of open space in between. Basically, they need somewhere to forage, somewhere to roost and somewhere to breed. The availability of suitable food determines the distribution of

a species, and this varies according to the degree of specialization in diet.

Those species that generally feed on the ground from grass seeds and burrs, tend to be very widespread and to travel long distances in search of their food. This is the case of the Galah, the Cockatiel and the corellas, the main species that adapt readily to the crops provided by European agriculture, and in many places these birds have become pests. More catholic species that take their food equally happily from the ground, from shrubs and even from tree canopies tend to be more restricted in their distribution, as occurs with Major Mitchell's and Sulphur-crested Cockatoos (*Cacatua galerita*). Some others have developed specialized races adapted to a particular food source found only in more restricted areas. For example, the northern race of the Red-tailed Black-cockatoo feeds mainly in the middle to upper storey of trees and shrubs, while the race in central arid and semi-arid regions usually feeds on the ground, eating seeds, often in spiny cases, of plants such as the weed *Emex* in the Western Australian wheatbelt. There are two other forest or woodland races, one in the west and one in the east, that specialize in eating eucalypt seeds in the canopy.

This dietary specialization is obviously linked to features of the environment, such as where certain trees or shrubs grow, when and how often they flower and fruit, and how much the crop of seeds varies between seasons. The more specialized species do not readily adopt new sources of food and do not cope well with the clearing of native vegetation.

Other more general features required by all cockatoos are trees to roost in by day and by night, and hollow trees to nest in. Trees suitable for roosting in can be either dead or alive, and where trees are lacking the birds often use man-made structures such as windmills, radio masts and electricity pylons. All cockatoos nest in tree-hollows and since none of them are "primary excavators", capable of creating a hollow for themselves, they must depend on the activities of fungi and termites to form hollows in mature trees. The size of the hollow required is largely dictated by the size of the bird, with the large black cockatoos that have long tails requiring wide hollows in the trunk of a tree, whereas Cockatiels can make use of quite thin

The conspicuous external feature of cockatoos that most readily sets them apart from the parrots of the Psittacidae is the movable crest. Normally held flat on the top of the head, it is commonly raised just after perching, in courtship display, and when the bird is alarmed or excited in any way. Crests vary considerably in shape and size according to the species.

Probably the most flamboyant is the crest of Major Mitchell's Cockatoo, remarkable for its colour pattern and the grace of the forward-curving feathers.

[*Cacatua leadbeateri*,
Australia.
Photo: John Cancalosi]





hollow lateral branches for which there may be few competitors.

Competition for hollows can be severe, and is increasingly becoming so, not only from other parrot species but from owls, kingfishers and other birds, as well as from marsupials, reptiles and bees such as those of the genus *Apis*. The future maintenance of hollow trees in the natural forests is a major conservation concern. In the past, such trees have been regarded by foresters as weeds, and have thus been removed. In the name of "fuel reduction" with the intention of preventing massive forest wildfires, frequent low-intensity man-made fires have led to many hollow trees catching fire and, with the hollow acting as a chimney, burning so efficiently as to achieve their complete destruction. In agricultural areas, the number of hollow trees is decreasing steadily as new land is cleared and old paddocks are "tidied up", with dead trees sawn for firewood. Most hollows form only in trees considerably more than 100 years old so that current well-intentioned planting of suitable trees that could ultimately provide hollows, while very necessary, will not be in time to avert a severe shortage that appears to be inevitable in the next 50 years. Work has started on the design, location and mounting of suitable artificial hollows to meet this essential resource for all cockatoos and the establishment of these on a large scale may well be one of the most important steps towards cockatoo conservation.

Some black cockatoos are quite happy to roost and nest in dense tall forest, but most other species prefer a more open canopy. Some like to nest at a distance from their nearest conspecific, and appear to defend a territory around one or more nest-hollows, as is the case of Palm, Major Mitchell's, Sulphur-crested, Philippine (*Cacatua haematuropygia*), White (*Cacatua alba*) and Salmon-crested Cockatoos (*Cacatua moluccensis*). Other species such as Galahs and corellas appear to tolerate pairs of the same species nesting quite close. Occasionally, a particularly suitable tree may provide hollows for several species concurrently: one such tree hosted one pair each of nesting Galahs, Major Mitchells, Cockatiels and Port Lincoln Ring-necks (*Barnardius zonarius*). Many hollows are used traditionally, year after year, which makes a species particularly susceptible to the

harvesting of nestlings for the aviary trade (see Status and Conservation).

Habitat suitable for cockatoos can be varied, depending on the species, but, provided their basic requirements are met, one or more species will be found in most parts of Australia and the islands to the north. Some have even penetrated suburbia on their own initiative, while others have become established due to the release of unwanted aviary birds; a large flock of Little Corellas can be seen in the city of Perth, far from their normal distribution. Recently, a similar flock of Little and Long-billed Corellas has built up in Tasmania, where they mingle with the indigenous Sulphur-crested Cockatoos at a large cattle feed-lot.

General Habits

Most species of cockatoo are sociable and forage in flocks. When a glut presents itself, several thousand birds may accumulate to feast; unfortunately agricultural crops, particularly those grown under irrigation, form such an attraction and cockatoos can reach pest status.

For the seed gatherers, particularly since the spread of mechanized agriculture, there are times of the year when gathering a cropful of seed is accomplished quickly in one or two hours, leaving a large portion of the day for the birds to sit and loaf. In summer, when days are long, most cockatoos adjourn to a shady daytime roost, usually chosen for its convenience to the current food source; an exception are Red-tailed Black-cockatoos that roost in the open even on the hottest summer days. Besides these morning and evening feeds, such seed-eaters need to drink once or twice a day, so that the daytime roost is quite often in trees close to water.

Towards the end of the day cockatoos move towards their nocturnal roosts, which may be a traditional flock roost used over several months; others return each night to the vicinity of their nest-hollow; some roost inside the trunk, others move up into denser canopy as night falls. Sometimes these roosts attract large numbers of birds, and since they are usually noisy assemblages, they tend to become well known locally and may be targeted either by angry farmers suffering crop depredations, or by bird catchers. Roosting, therefore, can be a weak link in the survival strategy for some species.

Most cockatoos tend to remain in the family group at least until the start of the next breeding season. As the young mature and become more independent of parental feeding, family groups tend to coalesce and to feed and roost in flocks of 30-50 birds, sometimes many more. Pair formation takes place in the flock. Since cockatoos can live for a long time, another benefit of this sociable lifestyle may be the long-term memory of the older flock members, but this remains to be proven. Perhaps the location of a water-hole in time of drought or the timing of an occasionally fruiting shrub and its location may enable a flock to survive a particularly stressful time.

Cockatoos are diurnal birds requiring full daylight to locate seeds on the ground or fruit in trees. Mostly, they are not early risers and they often wait for the morning sun to light the roost and provide direct warmth. Some species forage briefly in the early morning, returning to the nocturnal roost where most preen themselves before flying off for the day's serious business of finding food. Often the main food is several kilometres from the roost, but whether the species is a fast flier, such as a Cockatiel, Galah or corella, or a more leisurely traveller, such as a black cockatoo or Major Mitchell, a long flight between roost and food is normal behaviour.

The size of feeding flocks is basically determined by population density and the dispersion of food. With some foods such as seeds on the ground, birds feed just out of the pecking range of their neighbours. At other times when feeding on foods such as fruits or nuts on shrubs, or insect larvae in stems, they are further spaced out. Although there is no quantitative data, anyone who has tried to approach a feeding flock will know that there often appears to be an alert sentinel or two to screech a warning to its fellows. Who acts as sentinel and how often the watch is changed is not known. This behaviour has become a

The immense bill of the majestic Palm Cockatoo is unique, for the mandibles only meet at one point, leaving a gap in which the muscular black and red tongue can usually be seen. A vital part is played by the tongue in anchoring a seed or nut to be processed against the upper mandible, while the cutting edge of the lower works to crush or crack it, exerting tremendous pressure with the aid of powerful jaw muscles. Other notable features of this species are the dramatic length of the crest feathers, the unfeathered thighs and the bare cheek patches that deepen in colour when the bird becomes excited or alarmed so that it appears to "blush".

[*Probosciger aterrimus*, Irian Jaya.
Photo: Alain Compost/Bios]

part of Australian slang, in that when an illicit gambling game is in progress, particularly one called "Two-up", the person on the lookout for approaching authority is termed a "cockatoo".

Flocking behaviour is characteristic of all cockatoos with populations that are large enough, and the size of flocks can serve as an indicator of the conservation status of the species. The literature reports quite large flocks of the Philippine, White and Salmon-crested Cockatoos in the past but recently surveys have found it hard to locate these birds at all. However, large flocks can also give a misleading impression that all is well with the species. Cockatoos are long-lived birds and a large flock could contain mainly old adults with few new recruits. This could hide a conservation problem that could remain unrecognized until the old birds die off, and a sudden decrease in numbers is noticed. By then it would probably be too late to attend to the cause of breeding failure that has led to the overall decline, perhaps a loss of suitable habitat, a shortage of hollows, or too intense harvesting of nestlings for the aviary trade.

Species of birds vary enormously in their sociability, from the basic pair through group-living (usually extended families) and associations for anti-predator defence, to those that exploit local abundances of food that are often not long-lasting yet are much more than a few birds can exploit. With cockatoos, one has to add to this something that can only be termed "social enjoyment". Species such as the Galah and the corellas appear to revel in complex aerial flock-flying and, when perched, to enjoy acrobatic feats that have no obvious purpose other than "play". Both juveniles and adults join in these performances, in which they will swing upside-down, hanging by both feet from branches, or more usually powerlines, while flapping their wings and screeching; occasional short-circuiting may render this a terminal exercise, and also black out the neighbouring houses. With such long-lived birds that spend a large part of each day just sitting between feeds, it may well be that these apparently point-

less activities serve not only as training but as good exercise, much in the way suburban humans go to a gymnasium. As such, they no longer appear pointless activities and although "play", they are probably an important part of social life.

The close social contacts involved in communal day-roosting, allopreeing and even play not surprisingly lead to a fair bit of squabbling when individual distances are infringed intentionally or accidentally. These aggressive interactions can be very noisy but seldom result in serious damage or even in the displacement of an individual for more than a metre or so.

Under very hot conditions most cockatoos seek the best shade they can find and may pant with their bills open, wings held away from the body and the body feathers raised to facilitate air flow over the skin. In such extreme hot conditions, birds seldom move to feed until the sun has nearly set. When it rains after a prolonged dry spell, many parrots and most cockatoos indulge in a spectacular display that has been termed the "Rain Dance". Usually the actor ruffles its feathers and calls, before hanging upside-down from a branch with tail spread and wings outstretched and waving; this seems to facilitate the penetration of water to the skin. Sometimes this display can be invoked by sprinkling aviary birds with water from a hose.

A typical day in the life of a Galah in Western Australia is as follows. The birds that spent the night in a patch of woodland used for breeding are usually the breeding pairs. They become active soon after first light and may move around the canopy in which they spent the night, until they reach a more exposed branch touched by the early morning sun. Here they may bask for a few minutes on a calm morning before dropping down to forage briefly on the ground below. After 15-30 minutes, they return to an exposed branch, preening and just sitting. Gradually, the mood changes and one bird may call "Lik-lik", accompanying this with stretching the wing and fanning the tail, after which it flies. If sufficient birds follow the invitation, the group may fly off to-

Cockatoos are mainly sedentary, a tendency reflected in the relatively broad and rounded wing shapes of most species.

However, despite the many hours they spend at roosts, cockatoos are capable, strong fliers; they may daily need to cover considerable distances between roosting and foraging sites and back again. In general, speed of flight seems to depend on size; the smaller species are fast fliers with great powers of synchronized flight when in flocks, while the black cockatoos travel at a more leisurely pace with deeper wingbeats. The Yellow-crested Cockatoo is reported to share the distinctive flight action of several of its larger congeners, characterized by rather shallow, stiff wingbeats interspersed with gliding.

[*Cacatua sulphurea*.
Photo: John Downer/
BBC Natural History Unit]





Some cockatoo species are able to find their food in forests and woodland areas; others, primarily seed-eaters, are generally to be found foraging in more open areas, often on the ground. Black cockatoos frequent most kinds of wooded country, at all altitudes. The Yellow-tailed Black-cockatoo is commonly found in eucalypt and acacia woodlands and pine plantations, feeding principally on insect larvae, although its diet may include seeds and other items. Mainly an arboreal species, it is only occasionally to be seen foraging on the ground, as here on wild geraniums (*Erodium*).

[*Calyptorhynchus funereus whiteae*, Kangaroo Island, South Australia.
Photo: Jean-Paul Ferrero/Auscape]

wards the foraging area for that day. If the others fail to respond, then the flier will land again, wait until more birds are ready and then take off again. If the journey to the feeding area is of more than one kilometre, the group may pause at some convenient tree on the way, and such a place may serve as an assembly area, where several groups meet up and continue travelling together.

The chosen feeding area is usually an open paddock, which may be a growing crop, a patch of stubble left after harvesting, or a mixed pasture; in such cases the flock is well spread out with individuals 1–2 m apart. Where the food source is denser and more localized, for instance at an open silo or at a site of spillage, the birds feed closer together and interactions are much more frequent.

A foraging session may last anything from half an hour up to four or five hours depending both on the density of the seed on the ground and on the current needs of the bird; a parent feeding nestlings has to gather more food than a carefree immature. When the birds have filled their crops with this morning feed, they fly up to a convenient tree, where they will perch, preen, rest and interact while digestion proceeds. Outside the breeding season, pairs seldom return to their roosting area at this time. By mid-day, most Galahs are quietly perched in a shaded tree.

In the afternoon, the birds resume foraging, but this time, when they have eaten enough, they usually fly to the nearest safe watering place to drink. After drinking, the breeders tend to group up and fly off together to their regular roost-site, whereas the uncommitted members of the flock tend to roost in the nearest convenient patch of woodland.

In long-lived, fast-flying birds the care of the various parts of the body is important. Although cockatoos rarely bathe, they spend a considerable part of each day preening the feathers with the bill, especially the wing and tail feathers that are so important in flight. Each feather is drawn through the bill in turn, a process that effectively reconnects any barbs that have become detached, and removes any dirt or debris. The legs and feet are nibbled regularly, to clean them and remove loose skin. Throughout all these operations, the bill frequently probes the preen gland, where it becomes anointed with oil so that this is distributed to the various body parts.

Scratching is generally directed to the head and neck, the only places that cannot be reached by the bill. Either foot is used

and is usually brought forward under the wing without disturbing the wing from its position close to the body. It has been suggested that this behaviour has taxonomic usefulness (the alternative is scratching over the wing) but this has not been found sufficiently reliable to be of general use. Allopreening, the preening of another bird, is also generally directed to those places that are difficult for an individual to reach for itself; it is usually performed between members of a pair or between adult and offspring; it probably serves a bonding, as well as cleaning, function.

Chewing a variety of inedible objects may take place when birds are resting and it is tempting to call these “boredom” activities. However, careful study of the use that parrots make of their mandibles has emphasized the importance of maintaining these surfaces in good functional condition as they grow. Chewing probably serves to keep the mandibles trim and prevents them from overgrowing and deforming if they are not being regularly used on hard food.

The feathers of a cockatoo are capable of voluntary movement and, by change of position, can be used in both thermoregulation and communication. The extent to which crests have developed varies between species, as does the use made of them. Those of Major Mitchell’s and Palm Cockatoos are the most spectacular, followed by the other cockatoos with forward-curving crests. In three other species of cockatoo, the White, the Salmon-crested, and the Blue-eyed (*Cacatua ophthalmica*), the crest curves backwards and is less spectacular. Many cockatoos also have expressively mobile face feathers. The name of the genus *Calyptorhynchus*, meaning “hidden bill”, was taken from this feature because the face feathers sometimes almost conceal the mandibles. In contrast, “Face-fan” in the Galah is an alert position rather than the relaxed state described for *Calyptorhynchus*.

The body feathers may be held in one of four positions: sleeked, or pressed close to the body, the usual position before and during locomotion and when showing a subordinate position; relaxed, the normal position when the bird is perched or feeding; part-raised, as when, on cold mornings, the bird takes advantage of an insulating layer of air below the feather, or, when interacting with other birds, the actor seeks to appear as large as possible and to present the maximum silhouette; and fluffed-up, when the bird raises its feathers as far as they will go and, in the



Most species of cockatoo are sociable, gregarious birds. After the breeding season, families tend to join up in flocks that roost and forage together. Little Corellas, for example, may form huge nomadic flocks numbering many thousands. Attracted to agricultural crops that offer easy pickings, they can reach pest proportions and incur wrathful persecution. Nonetheless, flocking on this scale presents several advantages for the birds. For instance, they are able to exploit temporary food resources to the full. Flocks also provide some degree of protection from predators, such as birds of prey, and are often able to confuse them by their sheer numbers. A flock may have its own early warning system in the form of sentinels that stand guard when the flock is feeding and sound the alarm screeching and flying off at the approach of any danger. In addition, within a flock ample opportunities exist for pair formation among young birds, and replacements for lost partners are quickly found. Finally, an element of social enjoyment may also be involved. Watching a large flock wheeling in unison or performing complex acrobatic flights for no apparent reason one can hardly help feeling that they are flying for the sheer exhilaration of it.

[*Cacatua sanguinea gymnopsis*, Australia.
Photos: Roland Seitre/
Bios]

process, exposes considerable areas of bare skin, either to the falling rain in the Rain Dance, or to the rising sun after a chilly night.

Wing and tail feathers are obviously mobile and their movement is fundamental to the control and execution of flying. Apart from flight, the spreading, either fully or partly, of the large feathers of the wings and tail forms a conspicuous part of the displays of many cockatoos. Under heat stress, the wings may be held out from the body and slightly spread to provide a maximum cooling surface.

Since cockatoos take two to five years to reach sexual maturity, this means that for a large part of the year, populations consist of two parts: a non-breeding portion, which tends to be nomadic over a large area, exploiting ephemeral food abundances as they occur; and a smaller part consisting of breeding pairs that, because they have dependent offspring, tend to be limited in their movements by the need to return regularly to the nest-site. Breeding birds usually fly from the nesting area to forage with a local flock. Throughout incubation and brooding, parents of many species often share these duties so that only one member of the pair is free to forage at any one time. Whether these off-duty birds fly alone or with other conspecifics depends on whether the species nests in close proximity to others, as in corellas or the Galah, or widely separated, as in Major Mitchell's, Palm or Glossy Black-cockatoos.

The duration of this separation of breeding and non-breeding parts of the population varies according to the extent of a species' nomadic or migratory movement and the duration of family cohesion. The Short-billed Black-cockatoo breeds throughout much of the Western Australian wheatbelt but many individuals migrate to the coastal plain after breeding, where family or regional groups join up with non-breeding birds, forming flocks of more than 1000. Galahs usually desert their young when they are roughly 100 days old and, while the parents remain in local breeding groups regularly visiting their nest-hollows, the young birds wander extensively as a juvenile flock, ultimately settling and becoming part of a more stable nomadic group, perhaps 100 km from where they hatched. Major Mitchell's Cockatoos care for their dependent young longer than Galahs, and

although they move as a family to join the local non-breeding flock, they maintain family cohesion within the flock until the autumn. The same pattern of parental care leading to integration with the non-breeding flock is found in corellas, Palm and Short-billed Black-cockatoos.

No matter what the pattern of shedding young or the movements of non-breeding flocks, it is important to remember that in a healthy, renewing population, less than half of the birds will be breeders; most of the rest will be young birds that do not reach sexual maturity until they are two or five years old. In a situation where recruitment to the breeding population is affected by nest-robbing, inadequate food or insufficient hollow trees, the average age of the population will increase through lack of replacements, and the population will enter a decline which may take several years to become sufficiently obvious to cause concern. Monitoring of flock numbers alone is not a reliable index of population well-being; the proportion of recognizable juveniles added after the completion of each breeding season provides a more dependable measure.

Voice

No one has ever claimed that cockatoo vocalizations are beautiful: their calls tend to be strident and harsh, but carry a long way. These calls serve a number of useful functions, such as individual recognition, maintenance of flock cohesion, indicating the mood of the bird, as part of nest defence, warning of danger, and, in the case of dependent young, begging for food.

Fifteen different groups of calls have been identified in the Short-billed Black-cockatoo and about nine in the Galah. However, it is difficult to specify the number of calls accurately because some appear to form part of a graded series, such as the "Chet" call of the Galah, which ranges from a mild alert to extreme alarm, with decreasing intervals between "Chets". A variety of calls integrate flock movements by conveying intent or as a contact between flying birds. A longer syllable, "Cheat", is used by Galahs returning to a nest-hollow, and presumably identifies individuals of a pair to each other and parents to their young;



Trees are of paramount importance to cockatoos. Not only are they essential in providing cavities for nesting in, but they are in constant demand as perching and roosting sites day and night. After an early morning drink, Long-billed Corellas spend several hours feeding on the ground. In the midday heat they will roost quietly in trees, preening or loafing. Then comes another feeding session and towards dusk, after drinking again, they will return to their night-time roost. There may well be a spell of noisy group flying in and around the trees before they finally settle down for the night.

[*Cacatua tenuirostris*, Australia.
Photo: Roland Seitre/Bios]

Cockatoos often show forms of behaviour which to the human eye look like play, but which may have other significance.

In addition to merely resting or preening when perched, some species will indulge in energetic gymnastics, swinging or hanging upside-down on branches, like this Little Corella, flapping their wings and screeching repeatedly. For birds that are normally sedentary, these activities may perform the function of «keep-fit» exercises.

In the same way the apparently idle chewing of inedible objects may help to keep the mandibles in good condition.

[*Cacatua sanguinea sanguinea*, Kakadu National Park, Northern Territory, Australia. Photo: Hanne & Jens Eriksen/Aquila]



the latter in their fifth week begin to recognize their parents. Galahs also screech loudly when held and when bitten by or when biting another bird, and they screech in display against predators and in advertisement of their nest-hollows. Nestlings beg with a monotonous whine that continues until they are fed, when it changes to a "Food-swallowing Vocalization". Vocalizations by juvenile cockatoos may be of taxonomic value since their begging call is different from that of other parrots; they utter a slow, repetitive wheezing note, modified in the members of the genus *Calyptrorhynchus* to a rasp or squeak. The Food-swallowing Vocalization that occurs in juveniles of all species except the Red-tailed and Glossy Black-cockatoos is quite different from the begging call; it is a series of short, rapidly repeated, notes uttered when the young bird is engaged in swallowing food transferred from the bill of a parent. The begging calls are much quieter in Major Mitchells and corellas than they are in the Galah.

Major Mitchells do not have so many vocalizations as the Galah. The main call is a tripling "creek-ery-cree", which is very distinctive and carries for a surprisingly long way. Like the "Chet" call of the Galah, the frequency with which it is given indicates the mood of the bird and, with a flock flying in panic from a hawk alarm, reaches the level of an unsynchronized cacophony. This species also has a gentle contact call given at intervals of about a minute, when foraging in cover, and adults give very soft calls when about to feed their young.

Palm Cockatoos use four types of vocalization: an intimate quiet chatter between a pair preparing a nest-hollow; a double whistle used as the main contact call and in display; a single deep whistle used in flight; and a wailing call like that of a Spotted Catbird (*Ailuroedus melanotis*), given when feeding or preening. Also, the nestling has a characteristic monotonous begging call. Besides true vocalizations, Palm Cockatoos have a unique drumming display in which they use a piece of branch about 10 cm long, which they beat against the trunk of a hollow dead tree, creating a loud drumming sound audible up to 100 m away.

Gang-gang Cockatoos are relatively quiet birds; however, they communicate with each other often, while feeding, by means

of soft, growling notes. A contact call given in flight or from a tall tree is, in contrast, a harsh grating sound that is very characteristic and is said to resemble a rusty hinge or the sound made when pulling a cork from a bottle. Sulphur-crested Cockatoos give raucous screeches and sharp squawks and have a shrill disyllabic whistle. Corellas too are best known for their raucous screeching and a trisyllabic chuckling cry. Cockatiels in flight give a characteristic warbling call repeated three or four times, but they have six other calls.

Little is known about the calls of the Indonesian cockatoos in the wild, but in captivity they are recorded as giving various "screeches, whistles and screams".

Food and Feeding

Anyone who has been bitten by a cockatoo will know well the power they can exert with their large, broad bills! However, this does not mean that they invariably seek and eat large items, but that they are capable of gaining entry to a wide variety of fruits and nuts, some of them quite small; they can also rip branches to obtain access to larvae inside. Their bills not only serve the function of the nut-crackers we use to open walnut shells, but, combined with a very agile, solid tongue, they can manipulate the contents of a cracked nut or cone with such speed that a relatively small seed may become a profitable food source because so many can be processed in a short time. A few minutes spent watching a cockatoo in an aviary, processing its ration of mixed small seeds, will illustrate their dexterity. This combination of bill power and tongue agility enables most cockatoos to be very versatile in their feeding habits and to vary their diet.

Some feed mainly on the ground, from the ripe seeds of grasses and a variety of prickly burrs. Others, such as the Short-billed Black-cockatoo, take large quantities of flowering native shrubs rich in nectar, and, when feeding nestlings, forage for insects. At other times they may congregate shortly after a fire and feast on the massive seed release characteristic of several species of Australian shrub. Still others spend most of their for-



Though the search for food may take up several hours a day, cockatoos normally have plenty of time left for loafing, especially when at their midday roost. They may choose to sit quietly or to preen, while more strenuous activities are not uncommon and probably performed to keep the birds' feathers and muscles in trim. After a period of rest, cockatoos frequently stretch before beginning a different activity or taking wing. Here a male Red-tailed Black-cockatoo is caught extending one wing to the full, while at the same time tilting his fanned tail to the same side. Normally this exercise will involve both wings being stretched in turn in the same fashion.

[*Calyptorhynchus banksii*, Australia.
Photo: Brian J. Coates/
Bruce Coleman]

aging time in the canopies of trees and shrubs harvesting ripe fruit, nuts and seed pods, or excavating both dead and live wood to extract insect larvae. The Yellow-tailed Black-cockatoo has developed a special strategy for extracting larvae from the straight trunks of young plantation saplings: it first tears down a strip of bark to provide a perch on which it can stand while it excavates the tunnel in which the larva is.

Galahs, corellas and some black cockatoos feed mainly on the ground and in flocks. Short tarsi bring the eyes and bill close to the ground and enable a bird to search and harvest an area quickly and efficiently. The dispersion over the ground of the seed being harvested determines the pattern of flock foraging. Where seeds are densely accumulated in a small area, as under an acacia that has shed seed below its canopy, the birds feed in a dense group, usually with much squabbling. Where a uniform crop of grass or cereals has ripened and shed seed, the food is more dispersed and the flock may feed in a line, several birds deep, moving in a constant direction, usually into the wind. When food is in short supply, individuals may spend longer searching a particular area, and if the flock is large, it progresses in a rolling fashion, with the birds at the rear that have searched their patch flying to the front and resuming searching rather than foraging over an area depleted by their colleagues.

The amount of time that these granivores need to spend feeding in order to fill their crops varies widely, depending on the availability of seed and how difficult it is to find. In cereal-growing areas, once the grain has ripened and been harvested, a surprisingly large amount of grain, sometimes as much as 100 kg per hectare, remains scattered on the ground under the stubble, providing a resource for several months until rain germinates the seed. Immediately after harvest, spillage often occurs in transit; such bonanzas are obvious and accumulate dense flocks of feeding birds, particularly young ones. This means that for at least half the year, there is an abundance of food for some spe-

cies of cockatoos in the croplands, and since this is the time of year when days are longest, the birds rapidly fill their crops and spend the rest of the day waiting for it to be digested. In such circumstances, cockatoos feed twice a day, morning and evening, and usually only drink once.

At the other extreme, granivores searching for food in winter, when the days are relatively short and much of the grain has germinated, may spend most of the day foraging and will eat substantial amounts of green plant matter. In one winter when food was particularly scarce, a pair of individually marked Galahs was watched foraging on one patch of stubble throughout the day in conditions of minimal plant growth and few seeds; the pair fed for eight of the eleven hours of daylight that were available. Rain fell three days later and plant growth responded rapidly. Seventeen days later the same pair were watched all day and they foraged for only four hours, at the time of year when they were building up reserves for breeding.

The diets of different species of cockatoo living in the same area may be very different. For example, Short-billed Black-cockatoos have never been known to eat cereal grains, but they readily eat green wild geranium (*Erodium*) alongside the Galahs, which are renowned cereal-eaters. Instead, the black-cockatoo feeds on a very wide variety of native vegetation, eating seeds and flowers, and sometimes insects infesting the flowers. For most of the breeding cycle, the female is confined to the nest, incubating and brooding, where she is fed by the male several times a day. Later in the cycle, both parents forage and feed their young. These birds are not fast fliers and, when breeding, tend to forage close to their nest-site. At one site in Western Australia, where there was plenty of native vegetation, they harvested two species of *Banksia*, three of *Dryandra* and ten of *Hakea*, foraging only 1.4 km from the nests. At a second site in the wheatbelt where most of the native vegetation had been or was still being cleared and the vegetation was no longer continuous, the black-



Little Corellas, like other members of the genus *Cacatua*, often pair for life, and the very strong bond is maintained throughout the year. When perched, pairs keep close bodily contact and indulge in activities such as bill-rubbing, courtship feeding and mutual preening, especially of the head, all of which serve to reinforce the relationship between the pair. It is interesting to note that tame parrots often solicit their owners to scratch their heads, thereby demonstrating the strength of the bond that exists between them.

[*Cacatua sanguinea*
sanguinea, Kakadu
National Park, Northern
Territory, Australia.
Photo: R. Kunz]

cockatoos still fed on a wide variety of native species but as this was becoming scarcer and scarcer the birds had to forage further afield, an average of 2.5 km from the nest. As a result, because of the time spent searching for, and travelling to, scattered patches when they could have been feeding, some males were not able to provide sufficient food and females were seen foraging for themselves when they still had eggs requiring incubation. Not surprisingly, productivity was poor and by the end of a nine-year study, the species had abandoned that region for breeding.

In successful cases, once their young have fledged and become mobile, Short-billed Black-cockatoo families coalesce and many of the inland populations migrate to the coast where they forage over a wide range of species, including some seeds of eucalyptus and the cones of introduced pines grown for timber in large plantations, where flocks in excess of 1000 are regularly seen; virtually all these seeds are gathered from a shrub or tree and not from the ground.

Less is known about the Long-billed Black-cockatoo, which is primarily a forest bird. It eats the large seeds of marri (*Eucalyptus calophylla*) and insects. With its long bill it also manages to harvest the seeds from commercially grown apples, which does not endear it to orchardists. The race of the Yellow-tailed Black-cockatoo on the eastern side of Australia also eats both seeds and insect larvae, while the southern race is only a seed-eater and, like its western counterpart, forages in large flocks in pine plantations.

The Glossy Black-cockatoo has an extremely specialized diet, eating only the seeds from cones of different species of sheoak (*Allocasuarina*) that are patchily distributed over parts of south-east Australia. These cones take a year to mature and since they remain on the tree for another year at least, these cockatoos have a long-lasting reserve of food available all the year round, provided sufficient sheoaks remain. The feeding techniques used by these birds when they are eating *Allocasuarina* is complex and stereotyped. Only recently-mature russet-coloured cones are taken; old grey ones, even though containing seeds, are ignored. The cone is picked with the bill and transferred to the left foot, where it is held upside-down while the bird removes the stalk

and proceeds to dismantle the cone. This opens the valves, releasing the seeds, which are sorted by the tongue and swallowed. The cone is rotated in the foot during this process and the unwanted fragments are discarded. Cones weigh 1-3 g and handling time is correlated with size, taking from 50-140 seconds, with juveniles tending to take longer. During 111 hours of observation, Glossy Black-cockatoos were seen to feed only on the cones of *Allocasuarina*, and over nine months (June-February) they spent 88% of the daytime foraging, in contrast to the more leisurely lifestyles of other cockatoos. This emphasizes the dependence of Glossy Black-cockatoos on a specialized food, and the importance of the continued survival of sufficient *Allocasuarina* to support a local population throughout the year, without the need for the birds to waste too much time travelling or searching.

Gang-gang Cockatoos also feed in the canopy of trees and shrubs, usually in forest or woodland, where they eat the fruits of various *Eucalyptus* species. Rather in the fashion of Glossy Black-cockatoos, the green capsule is held in the foot while the bill rips it open and the lower mandible is used to scoop out the seeds, which are sorted by the tongue and swallowed. However, Gang-gangs do not have the dietary limitations of Glossies, and have readily accepted many of the exotic berries and fruits used in city gardens.

The various races of Red-tailed Black-cockatoo feed in different situations and ways (see Habitat). The subspecies *banksii*, *macrorhynchus*, *naso* and *graptogyne* feed on a variety of nuts and fruits mainly gathered in the canopy of trees. However, the inland form *samuelyi* does most of its foraging at ground level and in particular eats a wide variety of burrs and spiny-cased fruits. In the wheatbelt of Western Australia, an exotic weed, "double-gee" (*Emex australis*), has infested the newly cleared fields. *Emex* is relished by *samuelyi*, with the result that this form has followed the Galah in spreading into the wheatbelt from the semi-arid shrublands, its natural home. Of 237 feeding flocks watched in the wheatbelt, 219 were feeding on *Emex*. If an efficient method of controlling or eliminating *Emex* is found by the farmers, this race of Red-tailed Black-cockatoo will most prob-



A cockatoo may ruffle its plumage for temperature regulation, but also as a means of communicating with other birds. Normally, in a relaxed state, as when perched or feeding, the bird keeps its crest folded on the top of its head. When the crest is partially or fully raised, it is a sign that the bird is alert and it may be disturbed or excited in some way; such postures play a significant role in courtship display and the defence of territory. This Salmon-crested Cockatoo is showing alarm at the presence of an intruder by partly raising its crest and ruffling up the feathers all round its neck to form a huge ruff. By making itself so large it hopes to frighten off the intruder by producing a much bulkier silhouette.

[*Cacatua moluccensis*.
Photo: Alfred B. Thomas/
Animals Animals]



A high degree of social contact pervades most aspects of cockatoo life, as exemplified by these Little Corellas. At their daytime roosts birds often indulge in allopreening or various forms of play. In such circumstances, it is not unusual for there to be a certain amount of bickering, as birds may seek to displace each other from preferred spots. However, despite the inevitable hubbub, serious injuries are only rarely sustained, and the normal consequence is merely that the victor drives the vanquished out of immediate pecking distance.

[*Cacatua sanguinea* *sanguinea*, Kakadu National Park, Northern Territory, Australia. Photo: Hanne & Jens Eriksen/Aquila]

ably withdraw back into the shrublands. The two forest-living races of these birds have specialized in eating the seeds of certain eucalypts, marri in the south-west, and brown stringybark (*Eucalyptus baxteri*) in the south-east.

The stems of most cereal crops are not strong enough to bear the weight of a 300 g cockatoo trying to harvest the grain; the bird usually has to wait for it to ripen and fall to the ground, as usually happens with grasses in the wild. However, a few impatient individuals have learnt to fell the stalks by biting the base and eating the unripe grain; if the crop is dense enough, some learn to grasp several stems together and manage to reach the grain from that perch. More robust crops such as sorghum, maize or sunflowers will support large birds and pose no problem to those as big as Sulphur-crested Cockatoos.

For most cockatoos and many other seed-eaters, food is hardest to find during the winter. Not only has a large proportion of the seed bank already been eaten, but much of the remainder will have germinated with the onset of winter rain. With food in short supply and with fewer daylight hours in which to search for it, this is the most stressful time of the year and is when many birds perish. Some species solve this by being extensively nomadic between breeding episodes, but others, notably the two long-billed races of corella, have developed long upper mandibles with which they can dig out underground corns that are rich storage organs and very nutritious. At the other end of the scale, the Palm Cockatoo has a bill so large and strong that it can crack a *Pandanus* nut.

Breeding

In most aspects of cockatoo biology and ecology, the vast majority of what we know has been gathered during studies carried out in Australia. In contrast, the species inhabiting the islands

further north, from the Philippines through New Guinea to the Solomons, remain generally rather poorly known, and often the only data available on their breeding biology comes from captive birds.

In temperate regions, cockatoos breed in the late winter and spring, with a spread of laying over at least a month, usually preceded by three or four weeks' preparation of the nesting hollow. An exception is the Glossy Black-cockatoo, which lays in autumn, incubating throughout the winter. Yellow-tailed Black-cockatoos breed from March to August in the north of their range but from July to January in the south. Red-tailed Black-cockatoos in the Western Australian wheatbelt may breed twice in a year, rearing young each time, and similar behaviour may occur in particularly good years in the Victorian race of that species. In tropical and subtropical regions with summer rainfall, most cockatoos breed in the "dry" period, which is winter and spring, although to date few detailed studies have been made.

One of the advantages of living in a flock, as most cockatoos do, is that the initial pair formation of young birds can take place over many months, outside the breeding season. Another advantage is that when a member of a pair dies, a replacement is readily found from within the local flock and when this happens during the breeding season re-pairing can be rapid enough for the new pair to nest in that season.

Most cockatoos form long-lasting pair-bonds, with the birds remaining together throughout the year and generally returning to the same place, or nearby, to breed each year. With such enduring relationships, courtship preliminaries are minimal, with only the blackcockatoos indulging in courtship-feeding, where the male feeds the female. This establishes a vital routine that he will follow throughout incubation and brooding, which are performed by the female alone in these species. In the other species of cockatoo, where these duties are shared between the two parents, courtship is confined to the moments immediately before

With the dexterous use of its massive, strong bill the Short-billed Black-cockatoo makes light work of shredding the hard capsules of native Banksia and Dryandra species in order to extract the seeds and eat them. Of recent years it has also acquired a taste for the cones of the introduced *Pinus radiata* (seen here), regularly raiding plantations of these trees and causing a certain amount of damage. Most frequently to be found feeding in trees, it will readily forage on the ground, where it searches for fallen cones and the wild geranium *Erodium*, another of its favourite food items.

[*Calyptorhynchus latirostris*,
Australia.
Photo: Roland Seitre/Bios]



copulation, when it may last for several minutes and is usually initiated by the male in a tree near the nesting area. In the Galah the two birds perch side-by-side each head-bobbing and then breast-pointing before the male extends his neck and reaches over the neck of the female several times. If she accepts this invasion of her "individual distance" then he places his foot on her back and if she is ready she sinks down onto the branch and he proceeds to mount her and copulate. He thrusts his tail each side of hers several times until he finally dips his tail sideways under the female and achieves cloacal contact. Unlike many species of bird that copulate briefly and secretively in cover, in cockatoos the act may last for a minute or more. Although it can start a month before any eggs are laid, most copulation occurs in the week before the first egg appears and continues until the clutch is complete.

All cockatoos need hollows to nest in and as these become increasingly scarce, competition from other species for the existing ones is intensified. Usually, the larger species win such competition but species vary in the strength of their attachment to particular hollows and also in their willingness to reuse the same hollow in successive years. Some species, such as the Galah and the Palm Cockatoo, with breeding pairs resident in the same area year after year, may return to their hollows every evening and roost nearby. Other species, such as the black-cockatoos and Major Mitchells, leave the breeding location once the young have fledged and join flocks that forage nomadically over 50-100 km away. Obviously it is impractical for such species to return to their hollow each night but they do tend to return to the same area each year when it is time to breed. In the interval, their hollow may have been taken over by a conspecific or by another species of bird, mammal or reptile, and this usually provokes a prolonged battle for ownership.

The frequency with which hollows develop varies from one species of tree to another, and within one species of tree accord-

ing to climate and soil. Hollows occur either in the main trunk or in one of the side limbs. Those in the main trunk are usually vertical, and their depth may vary widely: one Galah incubated eggs at the bottom of a hollow 7 m deep, but a more usual depth is 1 m. Hollows in side limbs are usually narrower than those in the main trunk and tend to be used by smaller species. Vertical hollows are often open at the top where the upper part of the tree has broken off at a weak point in a storm, but such hollows are not always as perfect as they appear, since they may fill up with water in heavy rain. The diameter of a cockatoo at its widest, the shoulders, determines the minimum size of the hollow it can use. Cockatoos with long tails, such as Red-tailed Black-cockatoos, cannot turn round inside most hollows and so they back into them, tail first. Most other cockatoos enter head first and turn around inside in order to incubate or brood.

Whether to avoid waterlogging or not, most cockatoos prepare a bed of chips at the bottom of the hollow, on which they lay their eggs. Palm Cockatoos cut and carry sticks to the nest-hollow entrance and, standing there, shred the sticks to provide a nest lining. Galahs have an elaborate display as part of which they cut fresh green sprays, up to 300 mm long with leaves attached and carry these to their nest-hollow. Landing nearby, they proceed to thrash the spray against the tree and finally try to drop the spray down the hollow. Many miss and litter the ground below, providing a good indication of an active hollow. This display is performed by both male and female in bouts seldom longer than 20 minutes, with both partners usually present. This lining of the nest may begin five weeks before the first egg is laid and continues until the clutch is complete. If a nesting attempt by Galahs fails, the pair may reneest and use the same hollow again. Birds that do this pile sprays on top of the eggs or dead nestlings before they lay another clutch.

Although both partners usually share the preparation of the nest-hollow, in the blackcockatoos only the female incubates the



Though known to include insect larvae and various fruits, nuts and berries in its diet, the Western Corella is largely graminivorous. In addition to gleaning grain from the ground, it also digs up germinating cereals and raids growing crops, habits which are not calculated to endear it to the farming fraternity, and which have caused it to be widely persecuted. The individual seen here clutching a beanpod makes full use of its left foot as a «hand» to facilitate feeding, a common practice in species with zygodactylous feet.

[*Cacatua pastinator*, Australia.

Photo: Christine & Michel Denis-Huot/Bios]

eggs and broods the young nestlings and during this time she is provisioned by the male several times a day. The other cockatoos share these activities equally, taking it in turn to forage separately.

All cockatoos lay oval, white eggs that may become discoloured during incubation. Size varies from 55 x 40 mm (37 g) for the Palm Cockatoo to 26 x 18 mm (5.6 g) for the Cockatiel and is proportional to the maternal body weight. The identification of the eggs of different species of cockatoos is difficult, which made it hard for the authorities to police the traffic in eggs until the advent of DNA fingerprinting. Palm Cockatoos and Red-tailed and Glossy Black-cockatoos lay a clutch of only one egg, whereas Yellow-tailed and White-tailed Black-cockatoos lay clutches of two, of which usually only one survives to produce a fledgling. Gang-gangs usually lay clutches of two, but may lay three. Corellas and Major Mitchells usually lay three but may lay two or four, while the Galah averages four eggs, but may lay as few as two and as many as six. Larger clutches have been recorded but these are probably the result of two females laying in the same hollow. Cockatiels lay two to eight eggs.

The interval between the laying of successive eggs in a clutch varies with different females but individuals tend to lay at the same interval in different years. The mean interval between the laying of 282 Galah eggs in 33 clutches was 2.66 days, ranging from 2.5 to 2.8. Corellas and Major Mitchells probably lay at a similar interval but Short-billed Black-cockatoos lay their two eggs at an average interval of 8 days (1-16). With species that lay every third day and do not start incubation for more than a week after the start of laying, there is a possibility that two different females may believe that they own the one hollow. This probably is responsible for the super-large clutches of 10 and 11 Galah eggs and for the few mixed clutches containing both Major Mitchell and Galah eggs.

Large clutches laid at intervals of several days could take a week to ten days to complete. If incubation started with the laying of the first egg, hatching would be spread over a long time and the size disparity between nestlings would be very large. Galahs, Major Mitchells and corellas all tend to delay incubation until the penultimate egg is laid, with the result that most eggs hatch within a day of one another, with the last-laid egg one or more days later. This makes the calculation of the time necessary to complete incubation complicated; the best measure is the time taken by the last laid egg to hatch. This requires numbering the eggs as they are laid and close attention at hatching time, neither of which is often done for fear of the birds deserting. Twenty last-laid Galah eggs hatched between 22.2 and 25.9 days later, after a mean of 23.4 days' incubation; Major Mitchells and corellas probably take a similar time, but Short-billed Black-cockatoos take 28-29 days, and Cockatiels only 19-21 days.

Some cockatoos will re-lay after a failure, provided it takes place during the egg stage or in the first three weeks of nestling life, with the interval between failure and re-lay usually amounting to 14-20 days. Short-billed Black-cockatoos re-laid only in a hollow different to the one they failed in. In the Galah, 74 of 78 re-lays were in the same hollow after a new layer of fresh sprays was placed over the failed eggs or nestlings.

The length of time a nestling stays in the nest varies with the size of the species of cockatoo, the season, and, in those with more than one nestling, the effects of sibling competition. Data from the wild are confined to a few studies of individually marked birds, but even there, the day when a nestling actually left the nest is not always known accurately for fear of precipitating a departure by interference. There are more data from aviary birds but these have to be regarded with caution, since different feeding regimes may hasten or retard the process of nestling growth. Three aviary records for Palm Cockatoos give a nestling period of 78-81 days, while data from the field show that other large



An engaging species with a distinctive untidy forward-curling crest, the Gang-gang Cockatoo breeds in mountain forests, forming flocks and moving down to wooded coastal plains and more open spaces in winter.

Thriving on a diet consisting principally of eucalypt and acacia seeds, in recent years flocks of Gang-gangs have been observed in winter foraging in leafy suburban areas and ornamental gardens where they feast on hawthorn (*Crataegus*) and *Pyracantha* berries.

Their tameness at this time is proverbial; like this fine male, so engrossed are they in their feeding that they do not notice the approach of an intruder and may almost be touched.

[*Callocephalon fimbriatum*, Australia.

Photo: Roland Seitre/Bios]

black cockatoos and Sulphur-crested Cockatoos spend 9-13 weeks in the nest. Western Corellas averaged 60 days (52-68) in the nest, while Major Mitchells averaged 57 days (53-66) and Galahs 49 days (45-59). Aviary studies of the Cockatiel give a five-week nestling period.

One of the advantages of nesting in a hollow is that there is not the same urgency for the young to fledge compared with open-nesting species that are more liable to predation. This not only means that when they do leave the hollow most young cockatoos can fly competently, but that those species that raise several asynchronously hatched young in a brood are able to fledge them in turn over several days. However, the Short-billed Black-cockatoo, which occasionally raises two nestlings, usually deserts the second once the first has fledged. In general, most nestlings that die do so in the first three weeks of nest life, before they can keep themselves warm and when competition from larger siblings is most severe. This tends to be a cumulative process when the weaker nestling begs less strongly, is fed less and therefore becomes weaker still.

Productivity per pair is a measure of potential recruitment to a population, and is therefore an indicator of a species' viability. The figure most often obtained is the number of nestlings that leave the hollow, per pair of birds. This is not a perfect measure of the well-being of a population, for it ignores the considerable proportion of recent fledglings that meet with an accident and die. More serious still, the true measure of recruitment should also allow for deaths during immaturity, and this may be considerable for birds that do not breed until they are at least two or three years old, in some cases five. Nevertheless, from the four long-term studies of marked cockatoos that have been completed, comparisons and some generalizations can be made from the mean number of young that were fledged by each pair.

In a six-year study of Galahs, 41% of 2601 eggs that were laid produced a nestling that fledged; overall production was 1.92

fledglings per pair, when re-lays were considered. A similar study of Major Mitchells showed 47% of 207 eggs laid producing fledglings, an average of 1.6 fledglings per pair. The lower productivity per pair by Major Mitchells reflects the smaller average clutch size of 3.29 as opposed to 4.32. Although Western Corellas had a smaller average clutch size of 2.7, they too fledged 1.6 young per pair from 59% of all eggs laid, presumably reflecting the difference between an expanding population of Western Corellas, and a diminishing population of Major Mitchells retreating in the face of continued clearing of native vegetation.

A similar situation occurred with two populations of Short-billed Black-cockatoos. The viable one produced 0.63 fledglings per pair from 65% of nests laid in, while in the disappearing wheatbelt population (see Food and Feeding), only 35% of nests fledged young, giving an average of 0.34 per pair. This disaster was highlighted by a large number of females having to leave their eggs in the middle of incubation to forage for themselves in order to survive.

In some cockatoos such as Major Mitchells and Western Corellas, the fledged young hang around near the nest-hollow until their siblings join them, and then, after a few days, move as a family to a productive feeding area where they join a foraging flock. Galahs, which often fledge three or four nestlings, take them one by one over several days to a convenient patch of woodland up to a kilometre from the nest, where they join a crèche of similar-aged young birds. As the other members of the family leave the nest, they too are taken to the same crèche, where they are fed by their parents which may still be feeding siblings in the nest-hollow. Periodically, these crèches will take off and fly a brief, noisy circuit before landing again. This not only helps perfect their flying skills but teaches them how to fly close together in fast-maneuvring flocks, an essential part of life for a Galah. The interval between first and last fledging in broods of three to five birds may be 9-12 days, but is usually less.

In evolutionary terms, the emancipation of the female white and grey cockatoos appears to have made them much better able to withstand seasons when food is hard to find, and to rear large families in most years. These cockatoos share incubation and brooding duties equally, which means that each parent forages in turn throughout that time. Once the young can maintain their own body temperature, both parents forage together and feed the nestlings in turn. In black cockatoos, where only the female incubates the eggs and broods the unfeathered young, this pattern of behaviour obviously places a major strain on the capacity of the male bird to gather sufficient food for both himself and his mate, and ultimately for the nestling too. The balance between limited hours of daylight in which to forage in late winter and the availability of easily harvested food near the nest is crucial. This was clearly shown when the population of Short-billed Black-cockatoos in the wheatbelt of Western Australia ceased breeding there after five years of continued clearing of native vegetation.

Movements

Throughout the nesting season, breeding birds join flocks that are foraging within a kilometre or two of the nest. Apart from the added safety from predators offered by many pairs of eyes, to join a flock already feeding saves the time spent searching for food. Once all the young have fledged, most stay with their parents and join a local flock where they are fed by the parents for another month or two, gradually learning to forage for themselves. During this time the parents are usually moulting and become less and less interested in their offspring. Despite this, most families usually remain in the same foraging flock until the next breeding season comes around. Only a few species of cockatoo have been studied closely and these show different patterns

of movement according to food availability, season and tradition, although it is not always easy to separate these causes.

Short-billed Black-cockatoos in what is now the wheatbelt of Western Australia appear to have a traditional migration to the west or south coast once they have finished breeding. This probably reflects the long dry summer in that part of the world when water would have been extremely scarce inland before human intervention; probably food was difficult to find as well. However, Western Corellas in the wheatbelt faced with the same breeding environment have a different post-breeding movement. Each year the different groups that have been breeding travel 50-100 km to a traditional summering place also inland at Dalwallinu, where a flock of more than 1000 birds regularly accumulates. This location offers no relief, climatically, from the very hot summers. It has been suggested that this is a relict short-distance movement pattern that was meaningful when these birds lived nearer the coast, from which they have recently spread into the wheatbelt, much further from the cooler climate near the sea. In this scenario, the birds at the inland edge of their recently expanded range would not yet appear to have developed an appropriate strategy to counteract the local hot dry summer.

Short-billed Black-cockatoos that breed nearer the coast appear to forage within 100 km of the nest area following tree-lined rivers in the area, until it is time to breed again. Major Mitchells behave in much the same way, with breeders and non-breeders joining locally nomadic flocks of 50 or more birds. As winter approaches, several of these flocks may coalesce at a particularly favourable site for a month or two, or wander over 300 km² before returning to their particular nesting area.

With most cockatoos it is hard to point to any particular movement of immatures and call it "dispersal", because it is a gradual diminution of family ties, with little basic attachment to the natal area. However, Galahs have a different pattern of movement because the parents cease feeding their offspring much ear-



The Yellow-tailed Black-cockatoo is a specialist in seeking out the grubs of wood-boring moths and beetles that form its staple diet. The upper mandible is noticeably longer and more pointed than in other black cockatoos, which have more catholic tastes. Woodpecker-like, the bird clings to the bark with its claws, fanning out its tail to provide support. Once a promising hole has been found, the bird removes the bark, then tears down a strip of the tree which often serves as a working platform. The larva, once located, is carefully winkled out to be immediately swallowed. Though the cockatoo may help to remove harmful larvae from acacia and eucalypt trees, it can cause considerable damage, particularly to young saplings.

[*Calyptorhynchus funereus xanthonotus*, Tasmania.
Photo: Roland Seitre/Bios]

When water is scarce and predators lie in wait, drinking can be a very dangerous activity; as a bird lowers its head to drink it is especially vulnerable. Cautious in their approach, Galahs prefer, if possible, to perch on trees or fences that are either in the water or overhang it. Here, safe from danger, they will queue up if necessary for the most advantageous spot from which to drink. The bird lowers its bill into the water to fill it, then raises its head so as to swallow the water. Galahs normally visit a water-hole once a day, but in intense heat they may need to drink more frequently. Cockatoos are not known to bathe, relying on rain and thunderstorms to refresh their plumage.

[*Eolophus roseicapillus albiceps*, Lake Cowal, New South Wales, Australia.
Photo: M. P. Kahl/Auscape]



lier than do other cockatoos, and return to their nesting area. By this time, the young are 100 days old and with others of their age-group have already become part of a juvenile flock, which drifts downwind in search of fresh places to feed at. Throughout summer and autumn, there is an abundance of waste grain for them to find and little reason to stop their drift until the harder times of winter, with shorter days and little food available after most seeds have germinated with the autumn rains.

Relationship with Man

Although parrots have been kept as pets for more than two thousand years, it was not until the fifteenth century that sea trade between Europe and the East Indies started, and with that, the importation of the first cockatoo. Probably long before that the indigenous peoples of South-east Asia would have kept cockatoos as pets but there are no known records of this to date.

Many species of parrot are kept in captivity for a variety of reasons, from scientific investigation to avian "stamp collecting". A few, and especially the cockatoos, are kept as real pets: they become part of the family and rate highly as what are called "companion animals", providing and receiving affection particularly from lonely and incapacitated people. Part of the attraction of keeping cockatoos is their social nature and the way young birds imprint on their owners. Also, their longevity, which may well equal that of our own species, spares us from the trauma of the loss of short-lived, well loved pets. Several apocryphal accounts refer to birds, particularly Sulphur-crested Cockatoos, reaching a century in age. Certainly, there is good evidence of cockatoos living for 50 years.

Not only long lives, but a great capacity to mimic human speech, endears them to humans, causing amusement and sometimes embarrassment. They form the basis of many scurrilous

stories! On a more serious side, careful long-term research has shown that some cockatoos have the capacity to memorize a considerable vocabulary and to react to specific words.

Other relationships with man are less endearing, and many farmers try to protect their crops from the depredations of cockatoos by poisoning, shooting, trapping or acoustical scaring. That large birds, with diets in their natural state comprising a wide variety of seeds, should find our agricultural crops a bonanza quite unparalleled in nature, should not be surprising. Not only have species such as the Galah, corellas and Cockatiel rapidly adapted their feeding habits to include these new foods, but in many cases these crops have enabled cockatoos to expand their distribution into the changed environment, and to breed there very successfully. In Western Australia, Galahs, Red-tailed Black-cockatoos and Western Corellas have spread following the clearing of native vegetation and the establishment of wheat farms. In Victoria, a similar story has been enacted with the Long-billed Corella and crops of sunflower, while further to the north-east, the Cockatiel and others have found sorghum seed to be just the right size for their small bills. Cockatoos not only benefit from sown crops, but many of the herbivorous livestock animals raised by farmers are fed grain through periods of food shortage. Since they are not very efficient digesters of whole seeds many are voided in their faeces, still intact; Galahs and corellas do not reject such items.

Besides the farmers growing grain, orchardists also suffer from the depredations of cockatoos: by Long-billed Blacks in Western Australia, and Sulphur-crests in eastern Australia. Foresters, too, have had their problems: Yellow-tailed Black-cockatoos killed young sapling eucalypts in plantations, when extracting large larvae using a complex and very destructive process (see Food and Feeding). Short-billed Black-cockatoos ate so many pine cones that foresters could not harvest sufficient seed for new plantings in the 1950's. Fortunately, the foresters later



This elf-like male Cockatiel peers alertly from the entrance to its nest-hole in a dead tree. In this species, nests are typically sited in eucalypts standing in or near water. The timing of breeding is variable, depending on weather conditions, chiefly rainfall. The birds usually breed between August and December, but may begin as early as April. Little attempt is made to line the hollow, and the 4-7 oval white eggs are laid on a bed of wood dust. Both sexes participate in incubation, with the male sitting through most of the day and the female the night. This small but comparatively long-tailed cockatoo enters its nest-hollow tail first, as do black cockatoos, which may have problems turning in the confined space of a tree-hollow.

[*Nymphicus hollandicus*, Australia.
Photo: Dave Watts]

realized that plenty of seed remained in the cones dropped to the ground by feeding cockatoos, although they had by then developed early-maturing, low-stature seed trees. Both Galahs and corellas damage shade trees in towns and around homesteads by biting off the growing shoots during the summer; they also dig up playing fields and bowling greens in search of the well watered, succulent grass roots.

However, not all of the interactions with many cockatoos are on the debit side of the ledger. A particularly annoying weed, double-gee, has invaded the Western Australian wheatbelt. While its spiny burrs will puncture car tyres, they are tailor-made for the inland race of the Red-tailed Black-cockatoo (see Food and Feeding), which has spread from the semi-arid shrublands and thrives on this weed, even breeding twice in a year. Major Mitchells also enjoy double-gee, but Galahs find it more than they can handle.

Major Mitchell's Cockatoo is sometimes, less evocatively, known as the Pink Cockatoo. However, the name that is commonly used by most Australians is based on an early illustration by the explorer Major Thomas Mitchell, which he included in his journal. This was probably one of the earliest bird paintings available from Australia, and Mitchell's name has thus been duly commemorated for posterity.

Status and Conservation

The conservation status of cockatoos has been confused and perhaps somewhat underrated in recent years. BirdLife International currently lists seven species as globally threatened: the Philippine Cockatoo is considered Critically Endangered; the Yellow-crested Cockatoo (*Cacatua sulphurea*) Endangered; and the Glossy, Short-billed and Long-billed Black-cockatoos and the White and Salmon-crested Cockatoos Vulnerable. In addition,

the Palm and Major Mitchell's Cockatoos and the Western and Tanimbar Corellas (*Cacatua goffini*) are rated near-threatened. The Convention on International Trade in Endangered Species of Wild Flora and Fauna (CITES) lists all members of the family except the Cockatiel; of those listed, the Palm, Salmon-crested and Philippine Cockatoos and the Tanimbar Corella are listed on Appendix I, while all the rest are included in Appendix II.

An alternative rating, using the standards established by IUCN applied individually down to subspecies level, indicates that the survival of 13 of the 44 taxa in the cockatoo family is threatened: three qualify as Critically Endangered; four as Endangered; and six as Vulnerable. Three taxa would thus be rated Data Deficient, since there is insufficient information to categorize them more precisely, but they might qualify for listing as "near-threatened" according to BirdLife criteria.

In the islands to the north of Australia the continuing existence of seven of the 14 taxa of cockatoos appears to be threatened, largely due to loss of forest habitat and to increased aviary trade. The most precariously poised of all cockatoo species would appear to be the Philippine Cockatoo, which was once common throughout most of the Philippines but is now very rare, having disappeared altogether from several islands. With continuing human exploitation of the few remaining breeders, recruitment may be almost nil, so the species is currently considered to be Critically Endangered.

Indonesia comprises thousands of dispersed islands, many with large population problems and very difficult to administer as a whole. BirdLife Indonesia has carried out extensive surveys of many islands throughout the several archipelagos that constitute this nation. Based on this work the status of most species has been determined and attempts are now being made to control trade in wild birds. Recent surveys have shown diminishing numbers in all subspecies of the Yellow-crested Cockatoo, with the race *abbotti*, endemic to a small island in the Java Sea, rated

Cockatoos are not primary excavators. Like the other members of the family, the Galah requires a ready-made hollow in a branch or tree trunk for its nest-site, but several of its breeding habits are distinctive. A pair will defend the nest-site throughout the year, usually roosting nearby at night and using the same hollow in successive seasons. Close to most sites there is a conspicuous bare patch from which the bark has been removed. During breeding both birds frequently rub their bills and faces over this patch, perhaps to demonstrate possession. While most cockatoos make do with a few wood chips to line the nest, Galahs carry freshly cut twigs to the hole, and after beating these against the trunk they eventually succeed in dropping some of them inside. Both sexes take part in these displays which start well before laying and continue till the clutch is complete. Galahs lay an average of four eggs and incubation is carried out by both partners. Approximately two and a half months after hatching the young will leave the nest. On their maiden flight they are already proficient fliers, though landing techniques are somewhat unrefined at this stage and require practice! The parents continue to feed them for a further seven weeks, a relatively short length of time in comparison with some other cockatoos.

[*Eolophus roseicapillus*.
Photo: Jean-Paul Ferrero/
Ardea]





A juvenile Red-tailed Black-cockatoo in the nest, in the vertical shaft of a decayed tree stump. Any type of tree offering roomy enough accommodation may be used by this species, but most frequently it is a eucalypt. Holes open to the sky have their advantages, of which ease of access is one, but on the other hand they can become waterlogged in heavy rainstorms. Perhaps to help cope with this eventuality many cockatoos use wood chips as a basic lining to their nest-hollows. The young Red-tailed may take as much as 12 weeks before it is ready to leave the nest.

[*Calyptorhynchus banksii*, Australia.
Photo: Roland Seitre/Bios]

Critically Endangered, since only eight birds were seen during a recent survey. The other three races of this species are rated Endangered, since they have all declined drastically, and the population on Lombok has become extinct. The species as a whole is classed as Endangered. Both of the large Indonesian cockatoos, the White and the Salmon-crested, are also now very scarce, whereas large flocks were spectacular sights in the past; both are rated as Vulnerable.

In Australia, the Glossy Black-cockatoo is regarded as Vulnerable because of its patchy distribution and heavy dependence on one particular kind of food, namely the seeds of *Allocasuarina*. The populations of the two eastern races have not been estimated accurately and the extent of movement between local populations is not known but they are both independently rated as Vulnerable because each population numbers less than 10,000 birds and is severely fragmented. The Kangaroo Island race *halmaturinus* is considered to be Critically Endangered since the population numbers fewer than 200 birds, with 180 as the latest, 1996, count. Current studies have highlighted extreme competition for nest-hollows with other fauna and a shortage of food trees; the provision of artificial nest-hollows appears to be well accepted and feeding from newly planted stands of *Allocasuarina* is already occurring.

The breeding distribution of the Short-billed Black-cockatoo has shrunk by about a third over the last 30 years, as a result of extensive clearing of native vegetation to make way for wheat farming, and the species is now rated Vulnerable. The Long-billed Black-cockatoo, has suffered at the hands of orchardists, as well as through habitat loss. This species, which occupies tall forest, has been little investigated and, since no accurate estimates of the population have been made, the species might more appropriately be rated Data Deficient, though its current rating as Vulnerable may well be realistic. The same conclusion could also apply to the south-western race *naso* of the Red-tailed Black-

cockatoo, whereas the south-eastern race *graptogyne*, which lives in a restricted area of eucalypt forest, has been studied in some detail; since the population of the latter is estimated to number less than 2500 birds, all in the one population, this race is rated Endangered.

The Palm Cockatoo is much in demand as an aviary bird, and since it does not breed readily in captivity, this means that the trade has to depend on the capture of wild individuals. Although locally common on northern Cape York in Australia, its habitat there is endangered due to excessive burning, and in New Guinea timber harvesting on a large scale is in progress and causes concern. The species is currently classified as near-threatened, although it should perhaps be considered Data Deficient.

The southern race of the Western Corella numbers fewer than 2500 individuals and is rated Endangered, particularly because most of the population tends to accumulate in large flocks in summer and feeds on oat crops, at one particular location, making it very susceptible to the actions of irate farmers. Nevertheless, the species as a whole is "only" considered near-threatened.

Major Mitchell's Cockatoo occurs in large congregations during autumn and winter, but the very size of these flocks that constitute virtually all the birds from a large area may well mask a problem of very low recruitment, with poisoning, trapping and past habitat loss reckoned to be important factors in the suggested decline.

Sulphur-crested Cockatoos in New Guinea, Blue-eyed Cockatoos in the Bismarck Archipelago, the Solomon Corella (*Cacatua ducorpsii*) in the Solomon Islands and the Tanimbar Corella in the Tanimbar Archipelago appear to be secure at the moment but increasing timber extraction on a large scale may well cause problems for these species in the future.

The conservation of cockatoos is extremely difficult because by the time it is realized that there is a problem, the species is usually so far down the track to extinction that only rigidly en-

forced management has any hope of success. To achieve such management, it is essential to understand the basic ecology of the species, but even if sufficient funding is available, these data are often difficult to gather. Added to all this, when a species is much reduced in numbers, some visible aspects of behaviour and ecology may be those of desperate survivors and not those of a healthy population. It is particularly important to recognize this danger with such long-lived birds as cockatoos, where, for example, the remnant population may be an ageing one with no new recruits added for several years.

For most species of cockatoo this sort of information is lacking and so we must make the best of those studies that have been completed and try to extrapolate sensibly to those species in trouble. Unfortunately, the opportunities for further such long-term research are very few in the present climate of scientific funding.

Cockatoos face three quite different threats to their survival: diminishing habitat, including the loss of breeding hollows; the demands of the aviary trade; and the pest status of some species in relation to agriculture and horticulture.

In the past hundred years about 70% of the native vegetation in Australia has been cleared or extensively modified to provide for pastoral activities, timber extraction, farms and forestry plantations. These changes have benefited some species, such as the Galah, the Sulphur-crested Cockatoo and various corellas, that have appreciated agricultural crops as food and the increased availability of water provided for stock. For the more specialized cockatoos these changes have meant major reductions in both the variety and availability of their staple foods. Although the shortage of hollows is a major effect emanating from the loss of habitat due to clearing, for those taxa that are most specialized, the Glossy Black-cockatoo and the south-eastern Red-tailed Black-cockatoo, the loss of their food trees can be even more devastating. Planting of suitable species of *Allocasuarina*, a relatively quick-growing tree, has been carried out on Kangaroo Island, and already, after only ten years, Glossies are feeding from these plantings. The situation with the south-eastern Red-tailed Black-cockatoo still requires further investigation. Not only do they mainly eat the seeds of one particular eucalypt, the brown stringybark, but they prefer to use hollows in dead trees for nesting, and these are increasingly felled for firewood. The small

size of these populations makes them particularly vulnerable to catastrophic events, such as extreme wildfire, and so they need very careful management that ensures that both nest-sites and food resources continue to be adequate.

In both the Philippines and Indonesia the large-scale clearing of forests to provide wood-chips for export, and new farms for increasing human populations, has resulted in rapidly shrinking habitats for most species of cockatoo.

A specific aspect of habitat loss is that the loss of old trees leads to a shortage of hollows in which cockatoos can nest, and this is a major concern in the future conservation of all cockatoos. Basically, there are two approaches to this problem: first, it is necessary to create a general awareness of the seriousness of the situation by estimating the availability of hollow trees suitable for nesting in; and, second, it is essential to work out means of at least stabilizing the situation and to plan for the future so as to reverse the trend.

Deep in the remaining forests, there are still large numbers of hollows that are suitable for the few species that nest there, such as the Palm, Red-tailed and Long-billed Black-cockatoos. Most of the other species need hollows at the edge of forest blocks or in woodland with a more open canopy. Many of the remaining suitable hollows outside the forests are found in trees that have been left standing in fields to provide shade for livestock, are lining roadsides, or are in various isolated remnant patches that have usually been left uncleared because they were too difficult to cultivate, were used as catchments for water or as rubbish dumps.

Trees with hollows in them are usually old. Many of these are dead or dying and, without any interference from man, will not remain standing for ever; others will be cut for firewood while some will catch fire during repeated fuel-reduction burnings. That this already scarce resource is continuously diminishing is not generally appreciated because it is an insidious process, happening slowly over many years. To make the situation even worse, there are virtually no young trees growing naturally to replace the old ones because livestock and vermin have been allowed access, and the understorey, including young saplings, has been eaten or trampled.

The main difficulty in terms of doing anything to rectify this situation is the long time delay between planting new trees and

All cockatoos move on a daily basis, no matter what the season, in search of food and water, but in general their patterns of movement in the non-breeding season are poorly known. Most young birds remain in family groups and these join together to form flocks, which may or may not be nomadic, depending on seasonal conditions and the availability of food. In the Galah, at about three months old juveniles begin to form their own flocks, and to start drifting away from the breeding area. The parents gradually stop following them, while the now independent juveniles wander further away in search of new feeding grounds.

[*Eolophus roseicapillus*,
Australia.
Photo: Dave Watts/Bios]





In inland Australia the clearing of large areas of native vegetation to grow cereals and the introduction of livestock have had great effects on cockatoo populations. Some species, such as the Little Corella, quickly learned to use grain as an easy source of food and thus expanded their ranges and thrived to the extent that in some areas they are now agricultural pests. Cockatoos have also benefited indirectly from the introduction of livestock, which need a water supply, in the form of dams, water-holes and troughs; these have also become available to the cockatoos, which as seed-eaters need to drink at least once a day.

[*Cacatua sanguinea*, *Cacatua sanguinea*, Kakadu National Park, Northern Territory, Australia. Photo: Hanne & Jens Eriksen/Aquila]

their growing big enough to provide a hollow suitable for even the smaller cockatoos to nest in. It takes at least 100 years for a tree to reach this stage and this sort of time scale is difficult to envisage and even harder to plan with. Nevertheless, the long-term goal must be to plant trees, preferably those native to the area, that are suitable to produce hollows in sufficient numbers to sustain the cockatoo populations of the future. Meanwhile, the first step in reversing the downward trend is to recognize that hollow trees are a scarce biological resource and should be valued as such. This would mean extensive surveys to locate actual and potential nest-hollows so that if fire or timber harvesting was likely in their vicinity, action could be taken to ensure their safe survival.

In the past, much of the harvesting of cockatoo nestlings has been through destructive entry to the nest chamber using an axe or a chainsaw; this usually exposed the nesting area and left it open, rendering the hollow unusable in future seasons. Since many of these hollows were used traditionally year after year, the repair of these damages can be a worthwhile conservation exercise since the poaching of nestlings is fortunately much less common than it was, and protection is more efficiently enforced, particularly since many landholders are much more conservation-orientated than they were in the past. Other hollows may become unsuitable to the birds through a variety of natural events, such as a collapse of the internal "mudguts", the internal workings by termites, or the breaking off of a limb. Many of these damages can be repaired and the birds will reuse the hollows again.

A stop-gap approach is to provide artificial hollows for the birds to nest in. Many aviculturists use hollow logs brought in from the bush for their birds to nest in and some enthusiasts have tried to hoist such logs into trees to provide nest-sites for wild birds. Not only are such logs extremely difficult to handle and to fasten in position, but it has to be remembered that logs on the ground are essential homes for other fauna and one must be careful not "to rob Peter to pay Paul". Cockatoos have demolished many attempts to carpenter suitable hollows for them, by chewing them to pieces. A recent design using PVC storm-water piping appears to offer a practical solution and is under trial at present.

The demand for birds by the avicultural trade appears to be insatiable. An increasing number of affluent customers in many parts of the world provide a growing market for the trade and air travel has proved to be very convenient for the transport of live birds and very difficult to police. The thousands of Indonesian cockatoos that have been harvested every year over the last two decades has obviously reduced most breeding populations to danger point and in some cases, extinction has been brought about on certain islands. This situation is being urgently investigated by BirdLife Indonesia, and the results to date are very worrying. Attempts are being made to regulate the trade and for rangers to police reserves in an attempt to stop further poaching.

The Philippine Cockatoo likewise seems to be in extreme danger of extinction following widespread capture for the aviary trade. Local conservationists are attempting to guard known nest-sites on Palawan with a rather novel approach. Five former poachers are now called wardens and given incentives in cash, rice, T-shirts, transistor radios, and colouring books for their children. In return, the wardens guard the trees that they previously poached.

In contrast, although the species is listed in CITES Appendix I, a careful recent survey of the Tanimbar Cockatoo on Yamdena Island, in the Tanimbar Archipelago, found that the population appeared to be large and thriving, feeding on the maize crops grown by the villagers and roosting in adjoining large stretches of forest. This, despite export of as many as 13,500 birds in one year. These birds pose a difficult moral or ethical problem: the islanders grow maize for their own consumption; ironically, maize has no cash value as an export crop but the cockatoos do, and, if harvested judiciously, their sale could recompense the villagers for the crop depredations and help to raise their standard of living. How to permit such a trade, and police it without creating a precedent is difficult. At the same time, yet again it is essential to monitor recruitment, in order that any possible decline be detected at an early stage.

Attempts to regulate or even to monitor the international trade in wild-caught birds face difficulties. The CITES convention has laid down rules to be followed by "aviculturists, importers, taxidermists, scientific institutions, conservationists, tourists and con-

The Philippine Cockatoo, a white corella-type species, is currently the rarest of the Cacatuidae, with a total population estimated at 1000-4000 birds in 1992. Common until recently throughout the Philippines, it may now be restricted to Palawan and a handful of much smaller islands. The widespread cutting of native forests and extensive trapping are responsible for bringing this species to the brink of extinction. Locally, attempts are being made to protect known nest-sites from further poaching, and a European breeding programme is on foot to maintain a stock of captive birds. This species is currently considered to be Critically Endangered.

[*Cacatua haematuropygia*,
Philippines.
Photo: Günter Ziesler]



trolling authorities". Cockatoos are included in these lists but the difficulty of enforcing these regulations are immense since so many middle-men are involved. Furthermore, as in other walks of life, strict regulations tend to drive activities underground. In the case of birds, this has led to widespread, and presumably very lucrative, smuggling of protected species, particularly by air. With cockatoos, this may take the form of sedated birds confined to plastic cylinders in a traveller's suitcase, or a person wearing a specially tailored waistcoat with pockets holding dozens of eggs. The rewards are so great and in most cases the penalties on apprehension so small that a thriving trade continues.

A few aspects of science and responsible aviary breeding can help to reduce illegal trading. The use of numbered, closed rings that can only be fitted to very young nestlings means that unringed birds were not bred by a responsible aviculturist and were probably illegally taken in the wild. The insertion of a microchip into all legally aviary-reared birds identifies them for life without being visually offensive. Recently a prosecution was successful after DNA analysis showed that a bird claimed to have been bred from two individuals in an aviary was not related to either of those birds.

Finally, those species that have come into conflict with man's efforts to grow wheat or fruit have posed a problem for a long time. At first, such crops were isolated oases of bountiful food which attracted birds from far and wide in the surrounding countryside. With time, the areas being farmed grew and, although the pest-bird populations had grown considerably, they were spread over a much larger area and if a farmer discouraged them from ever settling on his crop, the problem would be moved on to his neighbour. Others, less thoughtful, resorted to poison, killing large numbers of Galahs, corellas and Sulphur-crests. Nowadays, public feeling has turned against such massive destruction, and farmers use more passive means, such as scare guns, occasional shooting and the planting of "sacrificial" crops near areas where a harvest was particularly valuable. At the same time, attempts were made to show farmers that the grain most cockatoos ate did not represent a cash loss that should have been in the bank, but was largely waste shed from incorrectly set harvesting machinery, over-ripe crops or overloaded trucks on the way from

field to storage. Careless storage in silos on the farm or at the railway sidings also attracted many birds to spilt grain. Extreme concern over weevils induced both farmers and the railways to tidy up around silos with a great reduction in the number of cockatoos free-loading. It was also pointed out that the grain the birds ate from the paddocks was available only until the rains came and caused it to germinate, and that there was usually plenty for both the birds and the sheep scavenging in the stubble.

Orchardists found bird damage very hard to control because birds soon became used to scare guns and took no notice. Poisoning was as ineffective as was shooting, but in the last 20 years, many orchardists have realized that netting the trees is not so extravagant as it first appeared, and that the increased market value of perfect fruit, unmarked by hail or birds, soon repaid the outlay.

Most cockatoos, especially those with clutches of 3-4 eggs, probably produce many more young than are necessary for the ultimate replacement of current breeding pairs. Many of these will die anyway. From the pest control point of view, these surplus young often form the bulk of the marauding flocks and limited control will probably have little effect on the breeding population. Likewise if the aviary trade was confined to such immature surplus birds, it would in effect be managing to harvest a renewable resource. Ethics and practical economics are in apposition here.

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PLATE 27

inches 7
cm 18



Subfamily CALYPTORHYNCHINAE

Genus *PROBOSCIGER* Kuhl, 1820

1. Palm Cockatoo

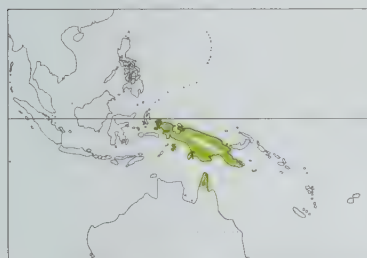
Probosciger aterrimus

French: Cacatoès noir **German:** Arakakadu **Spanish:** Cacatúa Enlutada
Other common names: Great Palm/Great Black/Goliath Cockatoo

Taxonomy. *Psittacus aterrimus* J. F. Gmelin, 1788, New Holland = Aru Islands. Monospecific genus. Original type locality probably based on faulty citation of Latham referring to another species of cockatoo. Proposed races *alecto* of west Papuan islands and *intermedius* of Aru Islands nowadays considered invalid. Three subspecies currently recognized.

Subspecies and Distribution.

P. a. stenolophus (van Oort, 1911) - N & E New Guinea and Yapen I.
P. a. goliath (Kuhl, 1820) - W Papuan Is and W. C and possibly SE New Guinea.
P. a. aterrimus (J. F. Gmelin, 1788) - Misool and Aru Is., and S Trans-Fly (S New Guinea); also Cape York, Australia.
Introduced to Kai Is (SE Moluccas).



Descriptive notes. 55-60 cm; 550-1000 g. Generally black with naked scarlet cheek patches and long, backward-curving crest; gape red, tongue red with black tip; massive bill grey-black, with upper mandible 94 mm long in male, 74 mm in female; eye dark brown; legs grey with bare grey thighs. Immature has feathers of underparts edged pale yellow. Races *goliath* and *stenolophus* larger than nominate, latter with narrower crest feathers.

Habitat. In New Guinea, frequents forest, forest edges, partly cleared areas, tall secondary forest, monsoon woodland and, locally, dense savanna. Mostly in lowlands and hills up to 1350

m. On Cape York Peninsula, frequents fringe zone between lowland monsoon forest and adjacent *Eucalyptus* woodland.

Food and Feeding. Chiefly arboreal feeder, taking seeds, fruits, nuts, berries and buds from a wide variety of plants, particularly *Pandanus* palm nuts; occasionally eats fallen fruits on the ground.

Breeding. Laying recorded Jul-Mar. Pairs are territorial and resident, nesting in hollows in the trunk of dead or living trees; hollow is lined with freshly shredded twigs prepared by both members of pair. Both partners have been seen to give spectacular drumming display at nest-hollow, using specially prepared stick or *Grevillea glauca* nut as a tool; drumstick is held in foot and beaten against hollow trunk. Usually 1 egg; incubation c. 33 days by female, which is fed by male; hatchling naked, not downy as in other cockatoos; nestling remains in the hollow for c. 3 months and is fed by female; in captivity, fledging 78-81 days. On fledging, young bird remains with parents until next nesting season approaches.

Movements. Territorial pairs are resident in a patch of forest that provides several nest-hollows. Pairs may associate together in flocks of up to 30 birds when foraging outside the territory wherever fruiting trees are available, but return to roost in their territories at night, where they are intolerant of other conspecifics.

Status and Conservation. Not globally threatened. CITES I. Currently considered near-threatened. Much sought after for aviary trade, which is illegal in Australia; development of methods to distinguish between Australian and New Guinea birds would help the authorities to police this trade; may be seriously affected by this factor, and listed on CITES I since 1987. In New Guinea, extent of lowland rainforest habitat has been notably reduced by logging, which continues. Status in Australia rated insufficiently known; the ecotone between tropical forest and woodland has been little modified, but more frequent fires late in dry season may destroy significant numbers of nest-hollows. Species is hunted for food in New Guinea, and possibly on Cape York too. Captive breeding programmes in Europe and North America.

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Genus *CALYPTORHYNCHUS* Desmarest, 1826

2. Red-tailed Black-cockatoo

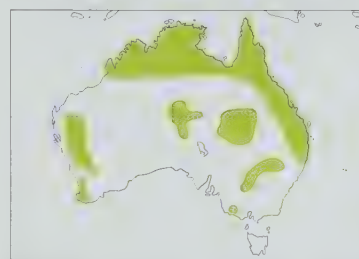
Calyptorhynchus banksii

French: Cacatoès banksien **German:** Rabenkakadu **Spanish:** Cacatúa Colirroja
Other common names: Banksian/Red-tailed Cockatoo

Taxonomy. *Psittacus Banksii* Latham, 1790, Endeavour River, Queensland. Until recently, species name commonly given as *C. magnificus* because that name had several days' seniority, but that description was based on illustration of immature female *C. lathami*. Five subspecies currently recognized.

Subspecies and Distribution.

C. b. banksii (Latham, 1790) - tropical N Australia.
C. b. macrorhynchus Gould, 1843 - NC & NE Australia.
C. b. samueli Mathews, 1917 - CW to CE Australia.
C. b. naso Gould, 1837 - forests of SW Australia.
C. b. graptogyne Schodde *et al.*, 1988 - forests of SE South Australia and SW Victoria.



Descriptive notes. 50-65 cm; 570-870 g; female smaller. Male uniformly black with broad red subterminal band across tail except on central two feathers; erectile, backward-sloping crest; bill and feet dark grey. Female brownish black with numerous yellow spots on head and shoulders; breast barred yellow; undertail-coverts barred orange-red; subterminal tail-band yellow-orange barred black, with central two feathers all black; bill bone-coloured; feet dark grey. Immature as adult female; male does not attain adult plumage until fourth year. Nominate race largest; *naso* has a proportionally large bill, while *graptogyne* lacks notch in upper mandible; large-

billed race *macrorhynchus* rather similar to, and often confused with, *C. lathami*.

Habitat. Nominate race in forests across northern tropical Australia; *macrorhynchus* occurs in woodland in E Australia; *samueli* in semi-arid inland shrubland, and, more recently, in cropland; *naso* and *graptogyne* found in widely separated eucalypt forests of SW and SE Australia, respectively, with latter separated from *samueli* by extensive area of mallee-spinifex.

Food and Feeding. Nominate race eats a variety of nuts and fruits gathered mainly from trees (*Terminalia*, *Pandanus*, *Eucalyptus*); *samueli* feeds much more on the ground, on a variety of burrs and hard seeds, e.g. double-gee (*Emex*) and *Erodium*; *naso* specializes in using its large strong bill to remove the large seeds from the 2-3 cm woody fruits of marri (*Eucalyptus calophylla*); *graptogyne* feeds on the fruits of a variety of forest eucalypts, especially red stringybark (*Eucalyptus baxteri*).

Breeding. Laying Mar-Oct in different parts of range. Nests in large, usually vertical hollows lined with woodchips. 1 egg (rarely 2); incubation 28-32 days, by female, which is fed by male; chick has long, dense yellow down; fledging 10-12 weeks. May breed twice in one year (autumn and spring); can renest after failure.

Movements. Dispersive, with seasonal pattern in some areas in response to availability of food; regular seasonal movements in N Australia. Parents may travel several kilometres to feed young.

Status and Conservation. Not globally threatened. CITES II. Nominate and race *samueli* numerous and in no danger. Race *macrorhynchus* is often confused with *C. lathami*, and present status unclear. Race *naso* has more restricted distribution; status insufficiently known, but probably vulnerable; currently subject to study. Race *graptogyne* also has restricted range; in severe danger through loss of hollows for nesting in, as a consequence of fires, logging and habitat clearing for agriculture, and insufficient regeneration; endangered, with a population of less than 1000 birds with fewer than 100 breeding pairs; currently subject to study. Protection of breeding hollows from careless burning (*naso*) and felling for firewood (*graptogyne*) is essential for future survival of these races.

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3. Glossy Black-cockatoo

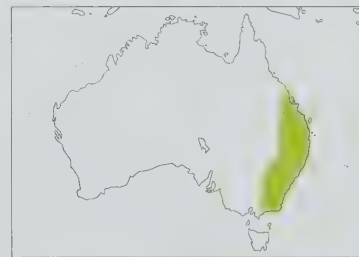
Calyptorhynchus lathami

French: Cacatoès de Latham **German:** Biaunkopfakadu **Spanish:** Cacatúa Lustrosa
Other common names: Glossy Cockatoo

Taxonomy. *Psittacus Latham* Temminck, 1807, Botany Bay, New South Wales. Three subspecies recognized.

Subspecies and Distribution.

C. l. erebus Schodde & Mason, 1993 - coastal CE Queensland.
C. l. lathami (Temminck, 1807) - inland and coastal E Australia.
C. l. halmaturinus Mathews, 1912 - Kangaroo I (South Australia).



Descriptive notes. 46-50 cm; c. 450 g; female smaller. Smallest black cockatoo, which, together with lack of a distinctive crest distinguishes present species from *C. banksii*. Brownish black overall with red subterminal panel in tail, narrower than in *C. banksii*; outer vane of outermost rectrix black; dark grey bill, with upper mandible bulbous and lower mandible broad and hollowed at tip; feet grey. Female has yellow patches on head and sides of neck; tail panel red and yellow barred black, with central two feathers all black. Immature like adult female, but with yellow body barring on throat and belly during first year. Race *halmaturinus*

has a disproportionately larger bill than that of nominate, whilst *erebus* has a smaller one.

Habitat. Dependent on sheoaks (*Allocasuarina*) in coastal forest and open woodland in E and SE Australia.

Food and Feeding. Appears to feed almost exclusively on the seeds of *Allocasuarina* species (*A. verticillata*, *A. littoralis*, *A. torulosa*). Cones are picked individually and fragmented in specialized bill to release seeds; these are then separated by working tongue and lower mandible against upper mandible and discarding the chaff; cone-handling time is 40-140 seconds, depending on size of cone.

Breeding. Mar-Aug. Nest is bed of chips in a large hollow of dead or live tree. 1 egg (occasionally 2); incubation c. 29 days, by female only; chick has long, dense yellow down; male feeds female which then feeds nestling; young bird leaves nest when 60-100 days old.

Movements. Birds follow fruiting trees around a locality throughout the year; usually in small groups but up to 40 birds may roost together.

Status and Conservation. VULNERABLE. CITES II. Rare and unobtrusive, and not widely known; historically, has suffered extensive habitat loss. Many areas of suitable habitat now protected in reserves and parks, but, with species' very specialized dietary requirements, local populations could become endangered if supply of *Allocasuarina* were to fail; care in ensuring continuing replacement of food trees is important. Race *halmaturinus* of Kangaroo I is endangered; it numbers fewer than 200 birds with only a small breeding population that has to compete for hollows with brush-tailed possums (*Trichosurus vulpecula*), honey bees (*Apis mellifera*) and the more aggressive *Eolophus roseicapillus*; a study of this race is in progress, to identify and suggest remedies for current very poor recruitment rate. Plantings of drooping casuarina (*Allocasuarina verticillata*), the prime food source, established only 10 years ago, are already bearing cones and attracting present species to feed.

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4. Yellow-tailed Black-cockatoo

Calyptorhynchus funereus

French: Cacatoès funèbre

Spanish: Cacatúa Fúnebre Coliamarilla

German: Gelbschwanz-Rußkakadu

Other common names: Funereal/Yellow-eared/Common Black-cockatoo, Black/Yellow-tailed Cockatoo

Taxonomy. *Psittacus funereus* Shaw, 1794. New South Wales.

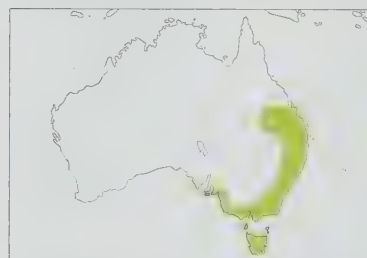
Forms superspecies with *C. latirostris* and *C. baudinii*; has been considered conspecific with former, and occasionally with latter. Southern races considered by some to form a megasubspecies. Three subspecies recognized.

Subspecies and Distribution.

C. f. funereus (Shaw, 1794) - EC Queensland (Emerald) S to E Victoria.

C. f. whiteae (Mathews 1912) - S Victoria to Eyre Peninsula (SC South Australia), including Kangaroo I.

C. f. xanthonotus Gould, 1838 - Tasmania and islands of Bass Strait.



Descriptive notes. 55-60 cm; 610-900 g. Male body plumage dusky black with upper body and wing-covert feathers finely edged buff; yellow ear-covert patch; broad yellow band in tail spotted dark brown, with central two feathers all black; bill dark grey, feet grey-brown; eye dark brown with pink periophthalmic ring. Female as male, but cheek patch brighter and bigger; bill bone-coloured; periophthalmic skin dark grey. Immature as adult female. Race *xanthonotus* smaller in wing and tail; race *whiteae* differs from *xanthonotus* essentially only in width of maxilla.

Habitat. Coastal heath, woodland, forest; also pine plantations along coast and on adjoining Great Dividing Range.

Food and Feeding. Nominant race eats both seeds and insect larvae, the latter extracted in specialized manner from infested *Eucalyptus* and *Acacia* saplings, using elongated upper mandible; initially a "chopping board" of bark is stripped to provide platform on which bird stands in order to excavate cossid moth larvae from stems of saplings. Race *xanthonotus* is primarily seed-eater, and large flocks feed on cones of exotic *Pinus radiata* plantations, tearing the cones apart.

Breeding. Breeds Apr-Jul in N Australia; Jan-May in N New South Wales; Dec-Feb in S New South Wales; and Oct-Mar in South Australia, Victoria and Tasmania. Nest is bed of woodchips in large tree-hollow. 2 eggs; incubation 28-29 days, by female only; chick has long, dense yellow down; usually only one nestling survives; fed by both parents, and leaves the hollow after 3 months, remaining with parents until at least next breeding season.

Movements. Poorly known or understood; nominate race tends to wander nomadically in parties of 10-20 birds when not breeding. Birds of race *xanthonotus* sometimes congregate in large flocks of up to 100 to feed on exotic pine cones.

Status and Conservation. Not globally threatened. CITES II. As with most other cockatoos, long-term existence depends on the continued availability of hollow trees for nesting in (see page 267). No race currently considered to be threatened, and all have adapted to recent developments in their habitat, namely eucalypt and pine plantations.

Bibliography. Adams *et al.* (1984), Blakers *et al.* (1984), Brown & Holdsworth (1992), Courtney (1986a, 1996), Forshaw (1981b), Joseph (1991), Lindsey, T.R. (1992), Macdonald (1988), McInnes & Carne (1978), Mills (1987a), Nelson & Morris (1994), Nias (1988), Pizzey & Doyle (1980), Possingham (1986), Saunders (1979a), Schodde & Tidemann (1986), Simpson & Day (1996), Sindel & Lynn (1989), Taylor & Mooney (1990), Trounson & Trounson (1987), Wells & Wellington (1992), Whatmough (1984).

5. Short-billed Black-cockatoo

Calyptorhynchus latirostris

French: Cacatoès à rectrices blanches

Spanish: Cacatúa Fúnebre Piquicorta

German: Weißschwanz-Rußkakadu

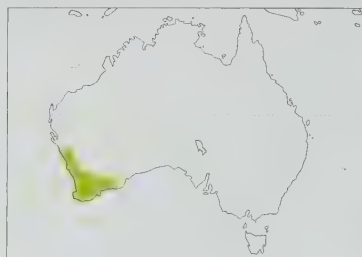
Other common names: Slender-billed/White-tailed/Carnaby's Black-cockatoo/Cockatoo

Taxonomy. *Calyptorhynchus latirostris* Carnaby, 1948. Hopetoun, Western Australia.

Forms superspecies with *C. funereus* and *C. baudinii*. Long considered conspecific with *C. baudinii*, but currently treated as separate species because ecology also quite different, and bill significantly shorter than that of *C. baudinii*; difficulty in field identification, compounded by long history of conspecific treatment, have led to uncertainty regarding limits of range in area of overlap, and to publication of some inaccurate maps. Exhaustive analysis of all specimens available in superspecies

suggested present species was so similar to South Australian *C. funereus* that it might perhaps be treated as race of latter. Monotypic.

Distribution. Inland and coastal SW Australia, in 300-750 mm rainfall zone.



Descriptive notes. 55-60 cm; 580-770 g; culmen 44 mm. Body plumage dusky black with buff margins to feathers; off-white patch on ear-coverts; tail has subterminal white panels, but central two feathers all black; eye dark brown; feet grey-brown. Sexes similar but periophthalmic skin pink in male, dark grey in female; bill grey-black in male, bone-coloured in female; female has larger ear patch. Juvenile resembles female; no immature plumage, immatures resembling adults except that males take at least a year to attain adult bill colour.

Habitat. Sandplain heath or shrubland and eucalypt woodlands, especially of wandoo (*Eucalyptus wandoo*) and salmon gum (*E. salmonophloia*), with annual rainfall in range 300-750 mm.

Food and Feeding. Uses short massive bill to shred cones of the native *Banksia* and *Dryandra* species and also the introduced *Pinus radiata*; after shredding, the seeds are eaten. Breeding birds also eat the flowers of a wide variety of heathland plants, and insect larvae. Usually feeds in a tree or shrub, but will forage on ground, as when eating wild geranium (*Erodium*).

Breeding. Laying Jul-Nov. Nest is bed of woodchips in a large tree-hollow. 1-2 eggs; incubation 28-29 days; female alone incubates eggs and broods nestlings, during which time she is fed by male; chick has yellow or white down; after 4-5 weeks, nestling is left alone while female forages with male, and from then on both members of pair feed nestling; fledging at 10-11 weeks. Only rarely do both nestlings survive at a nest. Birds do not breed until 4 years old.

Movements. Once young fledge, all members of family leave nesting area and join a foraging flock that moves nomadically; inland nesters move to coast, and flocks of several thousand birds may aggregate in coastal pine forests.

Status and Conservation. VULNERABLE. CITES II. Although large numbers still seen around Perth, Western Australia, the proportion of these that are juveniles from recent breeding is not known. Total population estimated at 9000-35,000 birds in 1977. Major concern is that breeding distribution has shrunk by one third in past 30 years, following clearing of native vegetation for wheat farming and extensive fragmentation of remaining habitat. The concern of foresters that they were not able to harvest pine cones for seed in competition with present species was allayed by producing seed cones in special remote seed orchards, where fertile cones mature on young trees not visited by cockatoos; it was also found that sufficient seed could easily be gathered from the ground below where the cockatoos had been feeding and had dropped many partially eaten cones.

Bibliography. Adams *et al.* (1984), Blakers *et al.* (1984), Carnaby (1948), Christidis & Boles (1994), Collar *et al.* (1994), Courtney (1996), Forshaw (1981a, 1981b), Garnett (1993), Jupp (1996), Lindsey, T.R. (1992), Macdonald (1988), Mawson (1995), Pizzey & Doyle (1980), Saunders, D.A. (1974a, 1974b, 1974c, 1977b, 1979a, 1979b, 1979c, 1980, 1982, 1983, 1986, 1990, 1991), Saunders, D.A. & Ingram (1987), Saunders, D.A. & Smith (1981), Saunders, D.A., Rowley & Smith (1985), Saunders, D.A., Smith & Rowley (1982), Schodde & Tidemann (1986), Scott & Black (1981), Simpson & Day (1996), Sindel & Lynn (1989), Smith & Saunders (1986), Trounson & Trounson (1987), Wells & Wellington (1992).

6. Long-billed Black-cockatoo

Calyptorhynchus baudinii

French: Cacatoès de Baudin

Spanish: Cacatúa Fúnebre Piquilarga

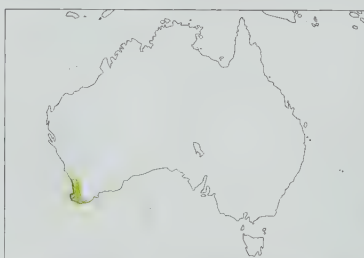
German: Langschnabel-Rußkakadu

Other common names: White-tailed/Baudin's Black-cockatoo/Cockatoo

Taxonomy. *Calyptorhynchus Baudinii* Lear, 1832. Albany, south-west Australia.

Forms superspecies with *C. funereus* and *C. latirostris*. Long considered conspecific with latter, but currently treated as separate species because ecology quite different, and bill significantly longer than that of *C. latirostris*; difficulty in field identification, compounded by long history of conspecific treatment, have led to uncertainty regarding limits of range in area of overlap, and to publication of some inaccurate maps. Present species has also, on occasion, been lumped in *C. funereus*. Confusion over bill size of bird used in original description led to proposal of race *tenuirostris*, but this name has now been shown to be synonymous with *baudinii* (see page 247). Monotypic.

Distribution. Forested extreme SW Australia.



Descriptive notes. 55-60 cm; 540-790 g; culmen 53 mm. Body plumage dull black with buff margins to the feathers; greyish white patch on ear-coverts; tail shows broad subterminal white panel, with central two feathers all black; eye dark brown; feet grey-brown. Sexes similar, but periophthalmic skin pink in male and dark grey in female; bill grey-black in male and bone-coloured in female; female has larger ear patch. Immature resembles female.

Habitat. Breeds in forests of jarrah (*Eucalyptus marginata*) and karri (*E. diversicolor*), in zones of higher rainfall, averaging over 750 mm per year.

Food and Feeding. Long upper mandible enables extraction of large seeds from the large fruit of marri (*Eucalyptus calophylla*); fruit is held in the foot during seed extraction. Also eats seeds of a variety of native plants (*Banksia*, *Dryandra*), and insect larvae. Removes seeds from orchard apples in the same way as seeds are extracted from marri, and in consequence species is sometimes regarded as a pest.

Breeding. Laying Aug-Jan. Nest is bed of woodchips in a hollow, high in either a jarrah or a karri tree. 2 eggs; in captivity, incubation by female 28 days; chick has yellow or white down; a nestling period of 16 weeks, in captivity, seems overlong, and realistic figure is probably similar to that of *C. latirostris*. Usually only one young survives to fledge.

Movements. After breeding, family groups tend to coalesce and form larger flocks that may forage nomadically N and E beyond their breeding distribution. Sometimes feeds in mixed flocks with *C. latirostris*.

Status and Conservation. VULNERABLE. CITES II. Currently still numerous, but concern expressed over continued frequent burning of forests and clear-felling (see page 266), especially in

conjunction with long time-span before a seedling eucalypt is likely to have a hollow usable for cockatoos. Total population estimated at 5000-25,000 birds in 1977. Orchardists still shoot marauding cockatoos under permit, but examination of the problem suggests that they would probably be economically better satisfied if they netted their trees.

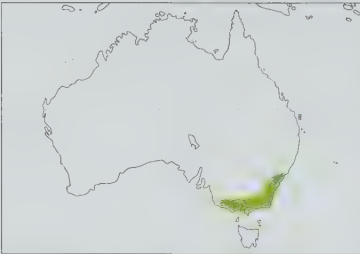
Bibliography. Adams *et al.* (1984), Blakers *et al.* (1984), Brouwer & Garnett (1990), Carnaby (1948), Christidis & Boles (1994), Coliar *et al.* (1994), Courtney (1996), Davies (1966), Forshaw (1981b), Garnett (1993), Lindsey, T.R. (1992), Macdonald (1988), Pizzey & Doyle (1980), Saunders (1974b, 1979a), Saunders *et al.* (1985), Schodde & Tidemann (1986), Simpson & Day (1996), Sindel & Lynn (1989), Trounson & Trounson (1987), Wells & Wellington (1992).

Subfamily CACATUINAE
Genus *CALLOCEPHALON* Lesson, 1837

7. Gang-gang Cockatoo
Callocephalon fimbriatum

French: Cacatoès à tête rouge **German:** Helmkakadu **Spanish:** Cacatúa Gang-gang
Other common names: Red-crowned/Helmeted Cockatoo

Taxonomy. *Psittacus fimbriatus* J. Grant, 1803, Bass River, Victoria. Monospecific genus. *Callocorydon* is a junior synonym. Monotypic.
Distribution. Great Dividing Range to coast, from Hunter R in N New South Wales to extreme S of border between Victoria and South Australia. Introduced to Kangaroo I (South Australia).



Descriptive notes. 32-37 cm; 280 g. Male has general plumage grey, with head and crest orange-red; feathers of upperparts edged with white, and of underparts with yellow; wings and tail dark grey; eye brown, bill horn, and legs grey. Female generally similar, but head and crest grey, and underparts edged with orange and greenish yellow. Juvenile resembles adult female, but male shows some red on forehead, crown and crest; immature male separated by shorter crest and faint barring on tail.

Habitat. Wooded coastal plain, tablelands and mountain forests up to 2000 m.

Food and Feeding. Seeds, fruits and berries from a wide variety of native trees and shrubs; also insects and their larvae. Food is gathered from the canopy, and only rarely, if ever, from the ground. In suburbia, frequently eats berries of *Crataegus*. Very tame while feeding.

Breeding. Nests Oct-Jan. Nest is a hollow very high in a subalpine forest eucalypt. Usually 2 eggs (1-3); chick has sparse yellowish cream down; in captivity, both parents incubate the eggs for 24-30 days, and feed the nestlings for 7-8 weeks. Fledglings are fed for 4-6 weeks more; members of family usually remain together all winter.

Movements. Altitudinal migrant, nesting high in mountain forests, but wintering on the coastal plain and tablelands. In the past 50 years, species has taken to foraging in well vegetated suburbs of towns and cities, particularly Canberra. Rare vagrant to King I and N Tasmania.

Status and Conservation. Not globally threatened, CITES II. Generally common, and population appears secure; indeed, appears to be becoming increasingly common due to overwintering in suburban Canberra. Nesting in tall forest trees that are difficult to find helps to protect present species from human nest robbers.

Bibliography. Adams *et al.* (1984), Blakers *et al.* (1984), Buchanan (1984), Chambers (1996), Courtney (1996), Forshaw (1981b), Hocking (1983), Hoppe (1983), Lane (1988), Lindsey, T.R. (1992), Macdonald (1988), Pizzey & Doyle (1980), Schodde & Tidemann (1986), Simpson & Day (1996), Sindel & Lynn (1989), Trounson & Trounson (1987), Wells & Wellington (1992), Wood, K.A. (1992).

♀

inches 7

cm 18

PLATE 28

ssp roseicapillus

8

ssp kuhli

9

10

ssp sanguinea

11

ssp gymnopsis

12

14

13

15

ssp sulphurea

16

*ssp citrinocristata**ssp fitzroyi*

17

ssp galerita

♂

18

♀

19

20

21

♂

♀



Genus *EOLOPHUS* Bonaparte, 1854

8. Galah

Eolophus roseicapillus

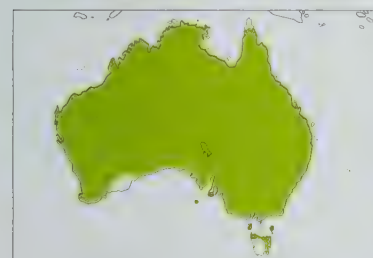
French: Cacatoès rosablin **German:** Rosakakadu **Spanish:** Cacatúa Galah
Other common names: Roseate/Rose-breasted/Pink-and-grey Cockatoo

Taxonomy. *Cacatua roseicapilla* Vieillot, 1817, "dans les indes" = Peron Peninsula, Western Australia.

Sometimes placed in genus *Cacatua*, but usually awarded its own monospecific genus, based on osteological and morphological criteria, supported recently by behavioural and biochemical studies. Original type locality not clearly specified, leading to confusion as to which of races was the nominate form: type specimen formerly thought to be from E Australia, with western populations awarded race *assimilis*; however, with discovery that the specimen belonged to the western race, nomenclature had to be revised (see page 247). Three subspecies currently recognized.

Subspecies and Distribution.

E. r. kuhli (Mathews, 1912) - Northern Territory.
E. r. roseicapillus (Vieillot, 1817) - W & WC Australia.
E. r. albiceps Schodde, 1989 - EC & E Australia S to Tasmania.



Descriptive notes. 35-36 cm; male 345 g, female 311 g. Very distinctive medium-small cockatoo; plumage quite unlike that found in any member of closely related *Cacatua*, although both *C. leadbeateri* and *C. moluccensis* have varying degrees of pink suffusion. Medium-grey with deep pink face, neck, nape and underparts, and a pinkish white cap; periophthalmic ring carunculated and larger in male; male has dark brown eye, female pink. Juvenile and immature both have brown eye. Races separated mainly on size and colour of periophthalmic ring: N race *kuhli* smaller than the other two; E race *albiceps* has crown and nape white with pink tinge only in nominate, pink in other two races.

Habitat. Originally occurred in woodland and grasslands of semi-arid and arid Australia; however, with considerable expansion of human settlement, present species has found agricultural cropland and suburban parks suitable alternative forms of habitat, and has expanded its distribution to the coast in most places.

Food and Feeding. Cereal grains, and sunflower and sorghum seed all eaten; when nesting, prefers green seedling *Erodium*. Eats a wide variety of seeds gathered on the ground, usually feeding in flocks of 10-1000 birds. When food is abundant, as in most summers, generally feeds twice a day, morning and evening, but drinks only once; in winter, when food is in short supply, birds forage for most of the day. Will undo stitching on bagged wheat in order to get at grain, and will fossick for undigested seeds in cattle and horse faeces. Flies strongly and very fast, and so is able to travel a long way between roost and food source.

Breeding. Laying Aug-Nov throughout most of range, but earlier in N tropics. Several pairs may breed in same patch of trees within 10-80 m of each other. Thick bed of freshly cut leafy branchlets is prepared in a hollow 16-700 cm deep; these hollows defended throughout year, and most pairs roost nearby every night. 2-6 eggs (mean 4.3), laid at intervals of 2-3 days; after 3rd or 4th egg laid, male and female incubate in turn for 22-26 days; chick has sparse pink down; nestlings remain in the hollow for 7 weeks, and fed by both parents; for first 8-10 days they are brooded by both parents in turn; because eggs hatch asynchronously, nestlings tend to vary in size and the brood may fledge over several days; fledging averages 49 days (45-59). Fledgling able to fly competently when it leaves the nest, and is taken by parents to a crèche in a nearby patch of trees; there they are fed until all their siblings join them; whilst in crèche, they learn elements of fast, cohesive flock-flying, and perfect their landing skills, which are lacking at first; parents continue to feed their young in juvenile flocks for less than 2 months; these flocks tend to drift away from the breeding area, effectively separating young from their parents by the time they are c. 100 days old; one persistent pair flew 16 km from their nesting hollow, where they had roosted, to feed their young in a juvenile flock. Success: 82% of eggs hatch; 59% of all hatchlings fledge.

Movements. Sociable, and usually found in large flocks of up to 1000 birds. Large flocks flying high in tight formation appear to be able to confuse raptors successfully. When moving to foraging areas, several pairs may fly together and can travel several kilometres to a favourite feeding site. Young birds more than 100 days old tend to disperse widely, wandering in juvenile flocks; this probably aided spread of species into wheatbelt and to coast.

Status and Conservation. Not globally threatened. CITES II. Common and secure; distribution has increased over the last 50 years. Regarded as pests of cereal crops by farmers, and killed under permit in some areas. Trapping and nest robbing for aviary trade are commonplace, but ineffective as an agricultural control measure. The sale of easily trapped young birds and their transport to another state for sale (e.g. from South Australia to Western Australia), which unfortunately is legal, has led to some genetic confusion; birds of this species, which make bad, biting pets, are often released by their disappointed temporary owners thousands of kilometres outside their natural range, and will readily mate with local birds.

Bibliography. Adams *et al.* (1984), Allen (1950), Badman (1981), Baxter (1991), Blakers *et al.* (1984), Browne (1990), Buckland (1977), Buckland *et al.* (1983), Buzzelli (1993), Christidis & Boles (1994), Courtney (1993, 1996), Cummins (1994), Emison & Nicholls (1992), Forshaw (1981b), Holyoak (1970a), Jones *et al.* (1978), Laubscher (1997a), Lindsey, T.R. (1992), Macdonald (1988), McNaught & Gurrall (1992), Noske (1980), Pidgeon (1970, 1981), Pizzey & Doyle (1980), Rogers & McCulloch (1981), Rowley (1980, 1983, 1988, 1990), Rowley & Chapman (1986), Saunders & Smith (1981), Saunders *et al.* (1982), Schodde (1988), Schodde & Tidemann (1986), Simpson & Day (1996), Sindel & Lynn (1989), Smith & Saunders (1986), Teague (1987), Tronson & Tronson (1987), Wells & Wellington (1992), Westcott & Cockburn (1988).

Genus *CACATUA* Vieillot, 1817

9. Long-billed Corella

Cacatua tenuirostris

French: Cacatoès nasique **German:** Nasenkakadu **Spanish:** Cacatúa Picofina
Other common names: Slender-billed/Eastern Long-billed Corella, Long-billed/Blood-stained Cockatoo, Cut-throat

Taxonomy. *Psittacus tenuirostris* Kuhl, 1820, New South Wales.

Alternative genus name *Kakatoe* now obsolete; official suppression proposed. Formerly considered conspecific with *C. pastinator*, incorporating *C. sanguinea*; on current evidence, the three forms probably best considered to constitute three separate species. Monotypic.

Distribution. Riverina of SC New South Wales, SW Victoria and SE South Australia.



Descriptive notes. 37-40 cm; 500-600 g. Mostly white, with small 33-34 mm crest; lores and forehead orange-scarlet, with scarlet band across throat; underwing and undertail tinged yellow; bill bone-coloured, long (42-53 mm) and slender; eye dark brown with large blue periophthalmic ring. Sexes similar. Scarlet band across throat distinguishes from both *C. pastinator* and *C. sanguinea*. Juvenile has shorter bill and less orange-scarlet.

Habitat. Grassy eucalypt woodland (*Eucalyptus camaldulensis*, *E. fasciculosa*, *E. ovata*, *E. melliodora*, *E. microcarpa*) and grassland, where annual rainfall is 250-800 mm, mainly in winter.

Food and Feeding. Uses specialized bill to dig up underground storage organs of a variety of native plants, many of which have now become rare; corellas now commonly eat two species of introduced onion grass (*Romulea*) and a variety of cereal crops; they also take grain from standing crops or from the ground. Since 1960's, they have begun feeding on sunflower (*Helianthus annuus*), a new crop for the district, available in autumn and winter, which is normally a time of food shortage.

Breeding. Laying Jul-Oct. Nest is decaying wood at bottom of tree hollow up to 25 m above ground. Several pairs may nest in one tree, in separate hollows. Usually 2-3 eggs (1-4); incubation 24 days, by both parents; chick has sparse pale yellow down; nestlings remain in the hollow 55-60 days; fed by parents in hollow, and then for a further 3 weeks after fledging. In exceptionally favourable years, species may breed twice.

Movements. Resighting of individually wing-tagged birds showed that species does not travel long distances; 85% of all such resightings were within 5 km of the capture site, while longest movement was of 77 km. Mean size of large feeding flocks varied with time of year and available food sources, from 419 (sunflower) to 122 (pasture).

Status and Conservation. Not globally threatened. CITES II. Currently secure; species continues to expand its distribution, and is even afforded pest status in some areas. Future concern over availability of nest-hollows is serious, as it is with most cockatoos (see page 267). Corellas were abundant before European settlement and thrived (as did Aborigines) on large quantities of a native daisy, murong (*Micromeria lanceolata*), which has a rich underground tuber. After 1837, pastoralists took up most of the Riverina for sheep grazing, and plants like murong became rare, to be replaced by non-tuberous introduced grasses and clovers; corellas fed on cereal crops and were shot and poisoned, so that by 1860's they had become rare in some places; degradation of native vegetation by rabbits late in 19th century probably accelerated decline of this population. However, decline was suddenly reversed in 1950's, possibly because numbers of rabbits declined following introduction of myxomatosis as a control agent; besides relieving competition, this also removed the need to poison rabbits, for which grain bait had often been used, with corellas being non-target victims. Recently established in Tasmania, where origins of population uncertain.

Bibliography. Adams *et al.* (1984), Anon. (1970), Blakers *et al.* (1984), Blaszkiewicz (1992), Brown & Holdsworth (1992), Christidis & Boles (1994), Courtney (1996), Emison & Beardsell (1985, 1989), Emison & Nicholls (1992), Emison & Temby (1987), Emison, Beardsell & Temby (1994), Ford (1985), Forshaw (1981a, 1981b), Green (1995), Lever (1987), Lindsey, T.R. (1992), Macdonald (1988), Pfeifer (1983, 1986), Pizzey & Doyle (1980), Schodde (1984), Schodde & Tidemann (1986), Schodde *et al.* (1979), Simpson & Day (1996), Sindel & Lynn (1989), Temby & Emison (1986), Tronson & Tronson (1987), Wells & Wellington (1992).

10. Western Corella

Cacatua pastinator

French: Cacatoès laboureur **German:** Wühlerkakadu **Spanish:** Cacatúa Cavadora
Other common names: Western Long-billed Corella

Taxonomy. *Licmetis pastinator* Gould, 1841, Swan River, Western Australia.

Alternative genus name *Kakatoe* now obsolete; official suppression proposed. Sometimes considered to include *C. sanguinea*, and in past was treated as conspecific with *C. tenuirostris*; on current evidence, the three forms probably best considered to constitute three separate species. Type specimen of race *derbyi* inadequately labelled and of doubtful origin and locality, since Derby is 1500 km N of the range of this subspecies; the name *C. p. butleri* Ford, 1987 is available and may well be validated in future. Two subspecies currently recognized.

Subspecies and Distribution.

C. p. derbyi (Mathews, 1916) - northern wheatbelt of Western Australia, between Dongara, Moora and Quairading.

C. p. pastinator (Gould, 1841) - centred around L Muir and Unicup, SW Western Australia.

Descriptive notes. 37-40 cm; male c. 700 g, female c. 600 g. White, with medium-length crest (47-56 mm) and long upper mandible (37-52 mm); concealed bases of the feathers of the head and neck

On following pages: 11. Little Corella (*Cacatua sanguinea*); 12. Tanimbar Corella (*Cacatua goffini*); 13. Solomon Corella (*Cacatua ducorpsii*); 14. Philippine Cockatoo (*Cacatua haematuropygia*); 15. Major Mitchell's Cockatoo (*Cacatua leadbeateri*); 16. Yellow-crested Cockatoo (*Cacatua sulphurea*); 17. Sulphur-crested Cockatoo (*Cacatua galerita*); 18. Blue-eyed Cockatoo (*Cacatua ophthalmica*); 19. White Cockatoo (*Cacatua alba*); 20. Salmon-crested Cockatoo (*Cacatua moluccensis*); 21. Cockatiel (*Nymphicus hollandicus*).



salmon red, showing as varying areas of red on face and forehead; underwing washed yellow; bare periophthalmic skin blue; eye brown; bill horn-coloured; legs grey. Sexes alike. Separated from *C. sanguinea* on generally larger size, with longer crest and longer bill; also on different calls. Juvenile as adult, but bill shorter. Race *derbyi* averages shorter bill (42 mm in male, 37 mm in female) than nominate.

Habitat. Grassy woodland and adjacent farmland.

Food and Feeding. Gregarious graminivore, but also takes insects and their larvae. Long upper mandible enables bird to dig up underground

storage parts of a variety of native plants, e.g. *Drosera*, growing in woodland; this food source became rare following European settlement and was replaced by cereal grains, native grasses and exotic weeds, e.g. *Emex australis* and *Rumex rosea*; the latter has a bulb that corellas dig up when the soil is moist. Birds also dig up germinating cereals and eat grain both from standing crops and from the ground.

Breeding. Laying Jul-Oct. Pair-bond maintained throughout the year. Nest is a bed of woodchips, in tree hollow in native eucalypts, mainly *Eucalyptus salmonophloia* in N and *E. calophylla* in S. Usually 2-3 eggs (1-4); incubation 22-26 days by both parents, and both feed the nestlings; hatching asynchronous, and brood reduction by death of smallest nestling occurs frequently in the first 2 weeks of nestling life; chick has sparse pale yellow down; young birds leave nest when c. 60 days old (52-68), and stay in contact with parents until autumn (Apr-May) of their first year. On average over several years, pairs raised 0-8 nestlings to independence each year.

Movements. Pairs tend to nest in traditional sites and to forage nearby while breeding, until fledglings are large enough to accompany parents into the large nomadic foraging flock that forms throughout summer, autumn and early winter; such flocks may draw families from 50-100 km away. Immatures leave family group before nest breeding season, to spend 3-5 years in a nomadic non-breeding flock.

Status and Conservation. Not globally threatened. CITES II. Currently considered near-threatened. Population of nominate *pastinator* may be increasing, but at present numbers c. 1000-1500 birds, and race is classified as vulnerable; this is especially pertinent as most members of the population gather to feed on localized oat crops. Race *derbyi* appears to have survived a long period (1860-1960) of harassment from farmers, who poisoned them, and shot them as agricultural pests; this population is now thriving and expanding.

Bibliography. Adams *et al.* (1984), Blakers *et al.* (1984), Carter (1912), Christidis & Boles (1994), Courtney (1996), Ford (1985, 1987a), Forshaw (1981b), Garnett (1993), Lindsey, T.R. (1992), Macdonald (1988), Massam & Long (1992), Mawson & Long (1994), Pizzey & Doyle (1980), Saunders (1977c), Saunders & Smith (1981), Saunders, Rowley & Smith (1985), Saunders, Smith & Rowley (1982), Schodde & Tidemann (1986), Schodde *et al.* (1979), Simpson & Day (1996), Sindel & Lynn (1989), Smith, G.T. (1982, 1991), Smith, G.T. & Moore (1991, 1992a), Smith, G.T. & Rowley (1995), Smith, G.T. & Saunders (1986), Stoneman *et al.* (1997), Trounson & Trounson (1987), Wells & Wellington (1992).

11. Little Corella

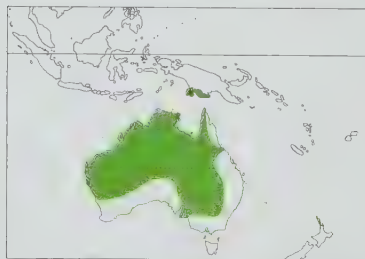
Cacatua sanguinea

French: Cacatoès corella **German:** Nacktaugenkakadu **Spanish:** Cacatúa Sanguínea
Other common names: Bare-eyed Cockatoo/Corella

Taxonomy. *Cacatua sanguinea* Gould, 1843, Port Essington, Northern Territory. Alternative genus name *Kakatoe* now obsolete; official suppression proposed. Forms superspecies with *C. goffini*. Sometimes considered conspecific with *C. pastinator*, and in past these two treated as conspecific with *C. tenuirostris*; on current evidence, these three forms probably best considered to constitute three separate species. Five subspecies currently recognized.

Subspecies and Distribution.

- C. s. transfreta* Mees, 1982 - lowland S New Guinea.
- C. s. sanguinea* Gould, 1843 - NW Western Australia and Northern Territory.
- C. s. westralensis* (Mathews, 1917) - Murchison R. Western Australia.
- C. s. gymnopsis* P.L. Sclater, 1871 - inland C & E Australia.
- C. s. normantoni* (Mathews, 1917) - W Cape York Peninsula.



Descriptive notes. 36-39 cm; 430-580 g; culmen 34 mm. White with medium-length (65 mm) crest and diagnostic short bill; face salmon pink, as are bases of feathers of head and throat that are usually concealed; undersurfaces of wings and tail washed with yellow; periophthalmic ring blue-grey, wider below the eye; bill bone-coloured; eye dark brown in both sexes; legs grey. Sexes similar. Juvenile as adults but periophthalmic ring smaller and paler blue. Race *gymnopsis* has wing and bill shorter, general coloration redder; *westralensis* similar to *gymnopsis* but separated by 1000 km; *normantoni* smaller in all dimensions and very similar

to *transfreta*, but latter has buff underwing coloration.

Habitat. Grassy woodland, scrub and grassland throughout tropical N and inland semi-arid Australia and S New Guinea.

Food and Feeding. Seeds of grasses and herbaceous plants, together with shoots, roots and blossom; also insects and their larvae. Sociable, foraging in large flocks, especially where grain fed to livestock. Numbers and range have increased following widespread provision of water from subartesian bores. Most seeds gathered from the ground, but where the plant is robust enough for the bird to land on it (e.g. sorghum), bird will feed directly on the ear of grain; control is not easy in the latter circumstances since, if bird is disturbed by shooting noise or explosive devices, it will drop the head it is feeding on, fly around a bit, settle again and begin to eat a fresh head, with result that damage can be doubled. Also feeds from troughs containing grain for livestock. Eats seeds of many different annual and perennial grasses when available.

Breeding. Laying in dry season (May-Oct) in tropics, in spring (Aug-Oct) further S, but May-Oct in South Australia. Nests in tree-hollows: hollow baobabs (*Adansonia gregorii*) much used in N, whereas elsewhere species typically nests in hollow eucalypts lining watercourses. 2-3 eggs (occasionally 4); incubation 24-26 days, by both parents; chick has sparse pale yellow down; nestlings remain in the hollow for c. 7 weeks, and are fed by both parents. After the young have fledged, whole family joins large nomadic foraging flock.

Movements. Strong flier, travelling long distances to water or to abundant food sources, e.g. a piggery, feed-lot or grain crop. Some very large flocks assemble, e.g. 32,000 birds at a sorghum crop, Kununurra, Western Australia; in such flocks members tend to roost together, but flock breaks up into smaller units for breeding.

Status and Conservation. Not globally threatened. CITES II. Common throughout inland and N Australia, frequently attaining pest status where irrigated cereal crops are grown. No definite population figures available, but species is undoubtedly secure at present. Recently established in Tasmania, where origins of population uncertain.

Bibliography. Adams *et al.* (1984), Beardell & Emison (1985), Beehler *et al.* (1986), Beeton (1985), van Bemmelen (1958), Blakers *et al.* (1984), Brown & Holdsworth (1992), Buzzelli (1993), Christidis & Boles (1994), Coates (1985), Courtney (1996), Ford (1985), Forshaw (1981b), Green (1995), Hoogerwerf (1964a), Lindsey, T.R. (1992), Macdonald (1988), McAllan (1988), Mees (1982a), Pizzey & Doyle (1980), Rand & Gilliard (1967), Saunders (1978), Saunders & Smith (1981), Saunders *et al.* (1982), Schmutz & Prus (1987), Schodde & Tidemann (1986), Schodde *et al.* (1979), Simpson & Day (1996), Sindel & Lynn (1989), Smith & Moore (1991), Smith & Saunders (1986), Trounson & Trounson (1987), Wells & Wellington (1992).

12. Tanimbar Corella

Cacatua goffini

French: Cacatoès de Goffin **German:** Goffinkakadu **Spanish:** Cacatúa de las Tanimbar
Other common names: Goffin's/Tanimbar Cockatoo

Taxonomy. *Lophochroa Goffini* Finsch, 1863, Tanimbar Islands.

Alternative genus name *Kakatoe* now obsolete; official suppression proposed. Forms superspecies with *C. sanguinea*. Monotypic.

Distribution. Larger islands of Tanimbar group. Introduced to Tual in Kai Is (SE Indonesia).



Descriptive notes. 30-32 cm; 300 g; female slightly smaller. Medium-crested white corella-type cockatoo, with pink on lores; remainder of plumage white, but with pink feather bases; undersurfaces of wings and tail washed yellow; periophthalmic skin pale blue; eye brown in male, reddish brown in female; bill and feet grey. Immature has dark grey eye.

Habitat. Cleared and cultivated coastal areas and inland forest.

Food and Feeding. Generally feeds on coastal plain and roosts in the forest inland; apart from the maize crops that species is notorious for plundering, little is known about the diet.

Breeding. No information for the wild. In aviary, incubation period 28 days and nestlings remain in the nest for c. 10 weeks; chicks has sparse white down.

Movements. Feeds largely on maize fields of coastal plain, flying to roost in forest. No long distance movements reported.

Status and Conservation. Not globally threatened. CITES I. Currently considered near-threatened. Population must have been very large to withstand onslaught of aviary trade in early 1970's. During period 1983-1987 average of 11,349 birds exported annually; species placed on CITES Appendix I in 1992. Thorough survey of Tanimbar in 1992 suggested total population of 300,000-400,000 birds, with c. 12,000 feeding on agricultural crops, chiefly maize grown for local subsistence and of no export value, whereas the cockatoos do have such value. If local human population did not export corellas, it is quite likely that they might eat them instead.

Bibliography. Andrew (1992), Anon. (1995a), Buzzelli (1993), Cahyadin (1993), Cahyadin, Jepson & Manoppo (1994), Coates & Bishop (1997), Collar & Andrew (1988), Künne (1991), Lannom (1991), Lantermann (1992, 1995), Lever (1987), Lim (1994), Low (1980a, 1993a), Murphy (1992), O'Connor (1977), Reinhard (1995), Schmutz & Prus (1987), Schulte (1975, 1990), Scott (1993), Smiet (1985), Sujatnika *et al.* (1995), Vít (1996a), von Rey (1997), Wells (1990), White & Bruce (1986).

13. Solomon Corella

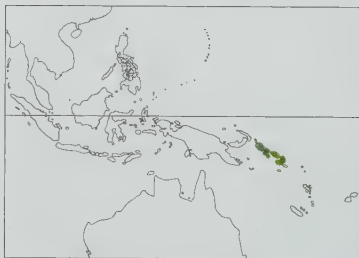
Cacatua ducorpsii

French: Cacatoès de Ducorps **German:** Salomonkakadu **Spanish:** Cacatúa de las Salomón
Other common names: Ducorps's/White(!) Cockatoo, Kaakata

Taxonomy. *Cacatua ducorpsii* Pucheran, 1853, San Jorge, Solomon Islands.

Alternative genus name *Kakatoe* now obsolete; official suppression proposed. Species name officially validated against *Ptyctolophus DuCrops* [sic]. Monotypic.

Distribution. Solomon Is, from Bougainville SE to Malaita and Guadalcanal.



Descriptive notes. 30 cm; 360 g. White corella-type cockatoo, medium-crested, and with pink bases to head feathers; periophthalmic skin pale blue; bill and feet grey; sexes similar, but eye of male dark brown, of female reddish brown. Immature has dark grey eye.

Habitat. Found universally throughout forest, up to 1700 m in cloud forest.

Food and Feeding. Eats fruits, seeds, blossom, leaf buds, epiphytes, large caterpillars and soft-bodied insects; raids native gardens, eating pawpaws and digging up sweet potatoes.

Breeding. Until recently, unknown. Eleven nests with young, estimated to be 4-5 weeks old,

recently found in Jun (3), Jul (5) and Aug (3). Nests were in natural cavities in trees, 20-25 m above ground. Brood size was 3 chicks (1), 2 chicks (9) and 1 chick (1); all nestlings had some body feathers still in sheath and primaries well developed; colour of natal down not documented.

Movements. Not reported in large flocks, occurring mainly in pairs or groups of 5-10 individuals.

Status and Conservation. Not globally threatened. CITES II. Present species is the only island cockatoo that has not been subjected to heavy trapping for the aviary trade. Precise information lacking, but species is still common, though likely to suffer in the future as result of increased pressure from logging.

Bibliography. Blaber (1990), Cain & Galbraith (1956), Coates (1985), Dahl (1986), Greensmith (1975), Hadden (1981), Kaestner (1987), Mayr (1945b), Schodde (1977), Sibley (1951), Sweeney (1996c, 1997c), Webb (1992, 1997).

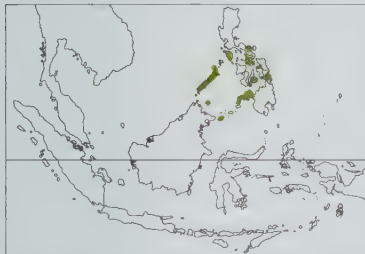
14. Philippine Cockatoo

Cacatua haematuropygia

French: Cacatoès des Philippines **German:** Rotsteißkakadu **Spanish:** Cacatúa Filipina
Other common names: (Philippine Islands) Red-vented Cockatoo

Taxonomy. *Psittacus haematuropygius* P. L. S. Müller, 1776, Philippine Islands = Manila. Alternative genus name *Kakatoe* now obsolete; official suppression proposed. Birds of Polillo supposedly larger, and have on occasion been placed in separate subspecies, *mcgregori*, but doubtfully valid. Monotypic.

Distribution. Once widespread throughout Philippines, but now possibly restricted to Palawan, San Miguel Is, Tawitawi, W Mindanao (Zamboanga), Siargao and Masbate, though also recorded recently on Mindoro, S Luzon, Bohol and Siquijor; may also survive elsewhere, where little recent ornithological research, e.g. Leyte, Samar.



Descriptive notes. 30 cm; 300 g. White, corella-type cockatoo with helmet crest and white periophthalmic skin; undertail-coverts red, edged white; underside of wings and tail yellow; bill pale grey; sexes alike, but eye dark brown in male, reddish brown in female. Immature similar to adult, with iris brown.

Habitat. Originally found in dipterocarp forest in rolling country of the interior, but most of this has now been cleared; mangroves suggested to be important too. Nowadays, in non-breeding season can be found at forest edge and on nearby maize fields.

Food and Feeding. Seeds, fruits, nuts and berries, ripening maize and wild bananas all recorded as food items.

Breeding. The few nests located in the wild held nestlings in May-Jun; others were active in Feb, Mar and Apr, with recent record of incubation in Feb on Palawan. From avicultural records: clutch 2-3 eggs; incubation 28 days; chick has sparse medium yellow down; young remain in the nest for 9-10 weeks.

Movements. Never reported in large flocks, but 4-12 birds were commonly sighted before the population declined.

Status and Conservation. **CRITICALLY ENDANGERED.** CITES I. A combination of trapping for sale into the avicultural trade and widespread deforestation of more than 80% of the native forests has reduced a once common species to the edge of extinction. Population of Palawan estimated at 800-3000 in 1991; elsewhere, recent figures are all perilously low, and total population of species reckoned to number perhaps 1000-4000 birds in 1992. Most, if not all, of currently used nesting hollows are closely watched by trappers and the nestlings removed for sale when big enough; sometimes a parent is removed as well; this system has been modified to help in conservation of present species (see page 268). Very likely that remaining small population in the wild is receiving little or no recruitment, and will decline further as ageing birds die. In Europe, aviculturalists are co-operating in European Co-ordinated Breeding Programme, and a studbook of captive birds is maintained.

Bibliography. Adriano & Palatino (1996), Boussey (1993, 1995a, 1995b, 1995c, 1996a, 1996b, 1997), Brooks, Dutson *et al.* (1996), Brooks, Evans *et al.* (1992), Buzzelli (1993), Collar & Andrew (1988), Collar *et al.* (1994), Delacour & Mayr (1946), Desborough (1991), Dickinson *et al.* (1991), DuPont & Rabot (1973a, 1973b), Dutson *et al.* (1992), Evans, Dutson & Brooks (1993), Evans, Magsalay *et al.* (1993), Gonzales (1983), Hachisuka (1934), Lambert (1993b, 1994a), Low (1992c, 1994a), Potter (1953), Poulsen (1995), Rabot (1977), Rand & Rabot (1960), Sinha (1993), Tabaranza (1992), Wright (1995).

15. Major Mitchell's Cockatoo

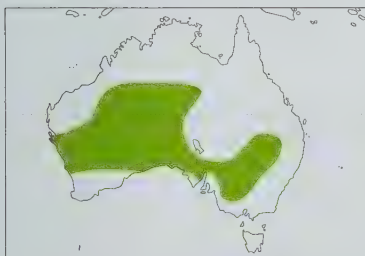
Cacatua leadbeateri

French: Cacatoès de Leadbeater **German:** Inkakakadu **Spanish:** Cacatúa Abanderada
Other common names: Pink/Leadbeater's Cockatoo

Taxonomy. *Ptyctolophus Leadbeateri* Vigors, 1831, New South Wales.

Alternative genus name *Kakatoe* now obsolete; official suppression proposed. Formerly subdivided into three subspecies, with recognition of races *mollis* and *superflua*, on basis of size and the quantity and colouring of the crest feathers, but recent study of 22 wild-caught pairs and examination of museum skins showed that criteria for subspeciation could not be upheld, at any rate without much further study. Monotypic.

Distribution. Throughout inland Australia, from S Kimberley region and EC Northern Territory S to CW coast near Geraldton and S coast at Eyre, then through inland South Australia, Victoria and New South Wales to S Queensland.



Descriptive notes. 35 cm; 360-480 g; female slightly smaller. White, with pink sides of head, neck and underbody, and narrow pink-red band on lower forehead; white crest (125 mm long) with broad orange-red band through centre enclosing a yellow stripe of varying width; underwing white with broad pink band in centre; bill grey-black; feet grey; eye dark brown in male, juvenile and immature; female develops red eye when two years old.

Habitat. Semi-arid to arid shrubland with tree-lined watercourses, where nest-hollows tend to be located; also found in woodland.

Food and Feeding. Like several other species of cockatoo, thrives on grain spilt during harvest and left lying on the stubble throughout winter, but present species has very strong bill and is able to extract seeds from a wide variety of native species, e.g. *Callitris*, *Casuarina*, *Grevillea*, *Hakea*, *Santalum*, *Acacia*, *Eremophila* and *Codonocarpus*. Many of these species fruit irregularly and the plants are scattered over a large area, and as a result one benefit of feeding in flocks of 20-30 birds is that older members of these long-lived animals can probably remember the locations of these scarce resources. Besides waste cereal grain, species eats seeds of a number of weeds, such as *Emex* and various wild melons (*Citrellus*, *Cucumis*). Insect larvae are extracted from branches of various eucalypts, acacias and *Codonocarpus*.

Breeding. In early Aug, pairs return to their traditional nest-hollows; laying Aug-Oct. Nest-hollow renovated by chewing the sides to make a bed of woodchips; neighbouring nests rarely closer together

than 2 km. 2-5 eggs laid, at intervals of 2-3 days; incubation 23-24 days, by both parents, usually starting with 3rd egg laid; chick has vestigial, short buffy white down; nestlings remain in the hollow for c. 57 days (53-66), and fed there by both parents. Family remains together near the nest until all nestlings have fledged, then joins other families in a local flock at a suitable food source; juveniles continue to be fed by their parents for at least 3 months. Sometimes a pair needs to evict a pair of (smaller) *Eolophus roseicapillus* that has moved in over the winter and starts to lay; occasionally a mixed clutch of these two species results and is incubated; when this mixed brood fledges, the *E. roseicapillus* grows up behaving as if it were a member of present species, ignoring conspecifics.

Movements. Families join a local nomadic flock during summer and spend autumn and winter wandering over 300 km². Flocks may number several hundred birds, and contain breeding and non-breeding birds. Pairs begin to visit their nesting territories in Aug, but return to forage with the flock. Flight is rather slow and laboured compared with that of *Eolophus* or corellas.

Status and Conservation. Not globally threatened. CITES II. Currently considered near-threatened. May be vulnerable, but insufficiently known on a continental basis. Clearing for agricultural development has stopped in all states except Queensland. Formation of large flocks in autumn and winter renders present species particularly susceptible to poisoning or trapping; although such flocks appear large, they represent all ages from a very large area, so that the small proportion of young recruits may be obscured; this could lead to complacency, and populations need to be monitored.

Bibliography. Adams *et al.* (1984), Blakers *et al.* (1984), Courtney (1996), Forshaw (1981b), Hobbs (1988), Hocking (1981), Klapale (1979), Laubscher (1995), Lindsey, T.R. (1992), Macdonald (1988), Mitchell (1837), Pizzey & Doyle (1980), Rowley & Chapman (1986, 1991), Schodde (1994), Schodde & Tidemann (1986), Silva (1992), Simpson & Day (1996), Sindel & Lynn (1989), Smith, G.A. (1978a), Smith, G.T. & Rowley (1995), Sweeney (1997a), Tronson & Tronson (1987), Wells & Wellington (1992).

16. Yellow-crested Cockatoo

Cacatua sulphurea

French: Cacatoès soufrière **German:** Gelbwangenkakadu **Spanish:** Cacatúa Sulfúrea
Other common names: Lesser Sulphur-crested Cockatoo

Taxonomy. *Psittacus sulphureus* J. F. Gmelin, 1788, Moluccas.

Alternative genus name *Kakatoe* now obsolete; official suppression proposed. Forms superspecies with *C. galerita* and *C. ophthalmica*. Possible races *djampeana* and *occidentalis* now regarded as synonyms of nominate and race *parvula* respectively. Four subspecies currently recognized.

Subspecies and Distribution.

C. s. sulphurea (J. F. Gmelin, 1788) - Sulawesi, and offlying islands of Muna, Butung, Tukangbesi, Tanahjampea, Kayuadi, Kalao, Madu and Kalaotoa.

C. s. abbotti (Oberholser, 1917) - Masalembu Besar I (Java Sea).

C. s. parvula (Bonaparte, 1850) - Sumbawa, Komodo, Padar, Rinca, Flores, Pantar, Alor, Semau and Timor (Lesser Sundas); also Lombok, where probably extinct, and Nusa Penida.

C. s. citrinocristata (Fraser, 1844) - Sumba (Lesser Sundas).

Introduced to Hong Kong and Singapore.



Descriptive notes. c. 33 cm; 350 g. White cockatoo with long, forward-curving yellow crest feathers, yellow ear-coverts, and yellow undersurfaces of wings and tail; bill black; feet grey; eye black in male, red-brown in female; bare periophthalmic skin pale blue. Immature similar to adult, but iris pale grey. Races separated on size, intensity of yellow on ear-coverts, and crest colour.

Habitat. Woodland and cultivation, but not found inside forests; occurs from sea-level up to 500 m on Sulawesi, and sometimes up to 1200 m elsewhere.

Food and Feeding. Feeds mainly in trees, taking seeds, nuts, berries and fruit. Destroys young fruits of *Ceiba* and *Gossampinus*, and attacks coconuts.

Breeding. Poorly known; birds in breeding condition in Sept/Oct. Nests in tree-hollow, e.g. in *Gossampinus*. 2-3 eggs. Other data from captivity: incubation c. 27 days, by both parents; chick has sparse yellow down; nestling remains in the nest for c. 10 weeks, fed by both adults.

Movements. Tends to roost communally and to feed in groups.

Status and Conservation. **ENDANGERED.** CITES II. Formerly common, but all races are currently endangered due to widespread trapping for the avicultural trade, in combination with habitat destruction; 7884 birds exported legally in 1984, although whereabouts of populations large enough to supply so many birds unknown to scientists; trapping of roosting birds with sticky poles may eliminate whole populations. Race *abbotti* critically endangered, with only 8-10 birds encountered in 1993. Probably extinct on Lombok and close to extinction on Sulawesi, Sumbawa and Flores; 7 separate sightings of 2-19 birds in Rawa Aopo Watumohai National Park, SE Sulawesi in autumn 1995. Not recorded on Nusa Penida (E of Bali) since 1986. Occurrence on considerable number of islands over extensive area may mask serious decline throughout most of range. Still fairly common on Komodo, in national park. Race *citrinocristata* may be vulnerable, due to habitat loss and trapping, combined with expected further loss of nest-sites. Numbers estimated at c. 2376 birds in 1992.

Bibliography. Allen (1924), Andrew (1992), Andrew & Holmes (1990), Behrens (1995, 1997a), Bertagnolio (1979), Butchart *et al.* (1993, 1996), Buzzelli (1993), Cahyadi, Jepson & Arif (1994), Cahyadi, Jepson & Syarif (1994), Coates & Bishop (1997), Collar & Andrew (1988), Collar *et al.* (1994), Coomans de Ruiter (1951), Ferrua (1984), Holmes & Phillips (1996), Jepson (1992, 1996), Jones, Juhaeni *et al.* (1994), Jones, Linsley & Marsden (1995), Kendall (1956, 1979), Lever (1987), Lim (1994), Low (1980c, 1991a), Mackinnon (1988), MacKinnon & Phillips (1993), Mallo & Setiawan (1996), Noske & Saleh (1996), Pipkin (1996), Poole (1996), Rensch (1931), Robson (1996f), Setiawan (1996), Stresemann (1940), Strunden (1982, 1995, 1997), White & Bruce (1986).

17. Sulphur-crested Cockatoo

Cacatua galerita

French: Cacatoès à huppe jaune **German:** Gelbhaubenkakadu **Spanish:** Cacatúa Galerita
Other common names: White(!)/Greater Sulphur-crested Cockatoo; Triton's Cockatoo (*triton*); Eleonora's Cockatoo (*eleonora*)

Taxonomy. *Psittacus galeritus* Latham, 1790, New South Wales.

Alternative genus name *Kakatoe* now obsolete; official suppression proposed. Forms superspecies with *C. sulphurea* and *C. ophthalmica*. Four additional races (*aruensis*, *macrolophus*, *kvalamkwalam*,

trobriandi) have been named from New Guinea and related islands, and another (*rosinae*) from mainland Australia, but none of these now considered valid. Four subspecies currently recognized.

Subspecies and Distribution.

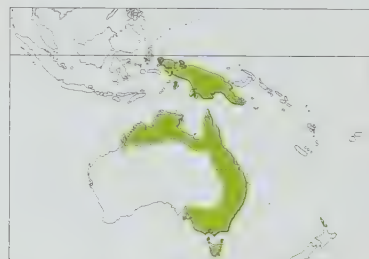
C. g. triton Temminck, 1849 - New Guinea and surrounding islands.

C. g. eleonora (Finsch, 1867) - Aru Is.

C. g. fitzroyi (Mathews, 1912) - N Australia, from Fitzroy R in NW to Gulf of Carpentaria in NE.

C. g. galerita (Latham 1790) - E & SE Australia from Cape York to Tasmania.

Introduced (*triton*) to E Moluccas (Seram Laut and Kai Is) and Palau Is (CW Pacific); also (*galerita*) to SW Australia and New Zealand.



Descriptive notes. 45-55 cm; 815-975 g. White cockatoo with yellow ear-coverts and 14 cm long, erectile bright yellow crest; underside of wings and tail washed yellow; bill black; feet dark grey; periphthalmic skin white; eye dark brown in male, red-brown in female. Juvenile like adult but eye pale brown. Race *fitzroyi* has little yellow on ear-coverts and periphthalmic skin is pale blue; *triton* smaller than *fitzroyi*, with broader crest feathers; *eleonora* similar to *triton*, but bill smaller.

Habitat. In New Guinea, occurs in lowland forest, up to 1400 m. In Australia, inhabits forest, woodland and cultivated cropland.

Food and Feeding. Wide range of seeds, fruits and buds gathered from the ground and in trees. Species considered a pest of cultivated crops, digging up recently sown seeds, eating ripening heads and grain fed to stock; long-renowned for flocks of foraging birds responding to alarm given by a sentinel individual (see page 250); also damages stored hay and grain, opening sacks and plastic-covered bales, and will sometimes also chew the wooden window frames of houses. Nominative race often feeds in large flocks of several hundred birds; the other races seldom seen in groups of more than 20.

Breeding. Season Aug-Jan in S Australia, May-Sept in N Australia; few records from New Guinea. Nest is bed of woodchips in a tree-hollow. Pairs tend to be territorial during breeding season and to nest far apart. 2-3 eggs; incubation 25-27 days, by both adults; chick has sparse yellow down; nestlings remain in hollow for 9-12 weeks, where they are fed by both parents. Fledglings remain with parents for several months, foraging together in a locally nomadic flock.

Movements. Strong flier, often foraging several kilometres from traditional roost or nest.

Status and Conservation. Not globally threatened, CITES II. Status stable in Australia and unlikely to change, so long as overseas trade in native birds is proscribed; populations in and around New Guinea reduced with recent clearing of forests, but not currently reckoned to be endangered. Birds released from captivity can rapidly multiply and establish populations outside their normal distribution, as has happened in Western Australia. Very popular as aviary birds but very wary and not easy to trap.

Bibliography. Adams *et al.* (1984), Beehler (1978b), Beehler *et al.* (1986), Blakers *et al.* (1984), Brown & Holdsworth (1992), Browne (1990), Buzzelli (1993), Chambers (1989), Coates (1985), Coates & Bishop (1997), Coberoff (1992), Courtney (1996), Diamond (1972a), Emison & Nicholls (1992), Finch (1982), Forshaw (1981b), Freud (1993d), Gilliard & LeCroy (1966), Howard (1991), Lever (1987), Lindsey, T.R. (1992), Macdonald (1988), Mayr & Rand (1937), Mees (1972, 1982a), Noske (1980), Pizzey & Doyle (1980), Pratt *et al.* (1987), Rand (1942a, 1942b), Rand & Gilliard (1967), Ripley (1964), Robertson (1985), Schodde & Tidemann (1986), Simpson & Day (1996), Sindel & Lynn (1989), Smiet (1985), Trounson & Trounson (1987), Vogels (1997), Wells & Wellington (1992), White & Bruce (1986), Wood, K.A. (1992).

18. Blue-eyed Cockatoo

Cacatua ophthalmica

French: Cacatoès aux yeux bleus

German: Brillenkakadu

Spanish: Cacatúa Oftálmica

Taxonomy. *Cacatua ophthalmica* P. L. Selater, 1864, Solomon Islands = New Britain.

Alternative genus name *Kakatoe* now obsolete; official suppression proposed. Forms superspecies with *C. sulphurea* and *C. galerita*. Monotypic.

Distribution. New Britain and New Ireland.



Descriptive notes. 50 cm; 500-570 g. White cockatoo with bases of head feathers and undersurfaces of wings and tail suffused yellow; large backward-curving yellow crest feathers hidden, until raised, by similar broad white feathers; bill grey-black; periphthalmic skin deeper blue than in any other cockatoo; legs and feet grey; male has eye black, female reddish. Immature as adult, but eye grey.

Habitat. Inhabits lowland tropical rain forest up to altitude of 1000 m.

Food and Feeding. No information available, but probably feeds on arboreal fruits and seeds.

Breeding. No information from the wild. In the aviary, 2 eggs are incubated for 28-30 days, with the young remaining in the nest for 12-13 weeks; no information available on colour of natal down.

Movements. Usually seen flying above the canopy in pairs; may congregate in flocks of 10-20 birds.

Status and Conservation. Not globally threatened, CITES II. Very little known of this species in the wild; said to be common in lowland forest. Rare in captivity overseas, but commonly kept on plantations around Rabaul. Species protected by law but, without more information about current status, no conservation measures can be contemplated. In the long term, loss of forests to logging will limit extent of suitable breeding habitat, and, as a consequence, recruitment. Extensive research required on ecology and biology; population surveys and monitoring also highly desirable.

Bibliography. Bloomfield (1984), Coates (1985), Dahl (1986), Eastwood (1995c), Gilliard & LeCroy (1967a), Griffiths (1965), Orenstein (1976), Sweeney (1996c), Whitear (1996).

19. White Cockatoo

Cacatua alba

French: Cacatoès blanc

German: Weißhaubenkakadu

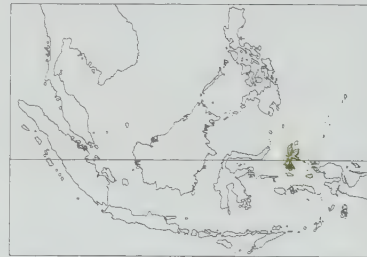
Spanish: Cacatúa Blanca

Other common names: Umbrella/White-crested Cockatoo

Taxonomy. *Psittacus albus* P. L. S. Müller, 1776, Moluccas.

Alternative genus name *Kakatoe* now obsolete; official suppression proposed. Forms superspecies with *C. moluccensis*. Monotypic.

Distribution. N Moluccas, on Halmahera, Bacan, Ternate, Tidore, Kasiruta and Mandioli. Specimens from Obi and Bisa thought to have been escapes.



Descriptive notes. 46 cm; 550 g. White cockatoo with underside of wings and tail washed yellow; large backward-sloping white crest, which is spread upwards and sideways to make head seem very large, but crest feathers not as long as those of *C. moluccensis*; pale yellow feather bases; periphthalmic ring whitish to yellowish white; bill grey-black; legs and feet grey; eye black in male, red-brown in female. Juvenile like adult, but eye dark grey.

Habitat. Flat or gently sloping primary and logged lowland forests below altitude of 600 m.

Food and Feeding. Mainly arboreal seeds and fruits; birds seen bark-peeling and investigat-

ing epiphytes suggest that species may also eat insects.

Breeding. Limited records from the wild suggest breeding starts early in year, with young in Apr-May, but also eggs in May. Nests in hollows in large forest trees. 2-3 eggs; incubation 27-28 days; chick has sparse bright yellow down; aviary-reared young remain in the nest for c. 14 weeks.

Movements. Never recorded in large flocks; generally in pairs or small groups.

Status and Conservation. **VULNERABLE.** CITES II. Although species used to be common throughout N Moluccas, numbers now much reduced due to logging of habitat, particularly the tall trees used for nesting in, and also due to trapping. Population estimates in 1991/92 were of 49,765-212,430 birds, of which 5120-7500 were caught, 937 being exported; legal quota for trappers has been reduced. Currently, both adults and young are taken, and it is considered that this level of exploitation is not sustainable. Research and survey work required.

Bibliography. Andrew (1992), Bräutigam & Humphreys (1992), Buzzelli (1993), Coates & Bishop (1997), Collar & Andrew (1988), Collar *et al.* (1994), Cooke (1987), Dingle (1995), Freud (1993b), Guinn (1970), Hartert (1903a), Lambert (1993a, 1993c, 1994b), Lambert & Young (1989), Low (1991a), Milton & Marhadi (1987), Poulsen (1996), Risdon (1968), Smiet (1982, 1985), Sujatnika *et al.* (1995), Vriends (1993), Waugh (1996a, 1996b), White & Bruce (1986).

20. Salmon-crested Cockatoo

Cacatua moluccensis

French: Cacatoès à huppe rouge

German: Molukkenkakadu

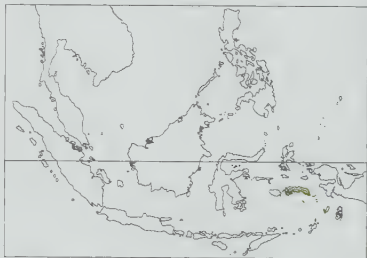
Spanish: Cacatúa Moluqueña

Other common names: Moluccan Cockatoo

Taxonomy. *Psittacus moluccensis* J. F. Gmelin, 1788, Moluccas.

Alternative genus name *Kakatoe* now obsolete; official suppression proposed. Forms superspecies with *C. alba*. Monotypic.

Distribution. S Moluccas, on Seram, Haruku and Saparua; also Ambon, where possibly introduced.



Descriptive notes. 50 cm; c. 850 g; female slightly larger. Overall coloration white or tinged salmon pink, with 15 cm long backward-curving erectile salmon-pink crest feathers; underside of wings and tail yellow-orange; bill grey-black; periphthalmic skin bluish white; legs and feet grey; eye black in male, dark brown in female. Juvenile similar to adult male.

Habitat. Lowland rain forest below altitudes of 1000 m.

Food and Feeding. Known to feed on seeds, nuts, fruits and berries; attacks green coconuts, chewing through outer layer to reach kernel.

Breeding. No definite information from wild;

possible breeding activity noted in May. In captivity: usually 2 eggs (1-3); incubation 28-29 days; chick has sparse yellow down; young stay in nest c. 14 weeks.

Movements. Usually occurs in small numbers, singly or in pairs, though up to 16 may roost together.

Status and Conservation. **VULNERABLE.** CITES I. Formerly a common species of lowlands within range, but, as elsewhere in Indonesia, trapping of cockatoos for export to the aviary trade, together with extensive clearing of forest, has resulted in a drastic decline; survey work showed species to be much commoner in primary forest (c. 9-10 birds/km²) than in recently logged forest (c. 2 birds/km²). In 1982, Manusela National Park set up, occupying 186,000 ha, 10% of island of Seram; by 1985, present species had become extinct in most of its previous distribution, with remaining stronghold in rain forest of that park, although even there it was still trapped. Total of 6-8 birds seen on Ambon during two visits in 1995. In 1982, total of 6413 birds exported, making up 15% of all local bird exports; in late 1989, species placed on CITES Appendix I. Breeds readily in captivity; this tendency might usefully be exploited as a potential means of reducing pressure of bird-trappers on wild populations; breeding programme in Europe.

Bibliography. Andrew (1992), Bowler (1988), Bowler & Taylor (1989), Buzzelli (1993), Coates & Bishop (1997), Collar & Andrew (1988), Collar *et al.* (1994), Ferguson-Lees & Faull (1992), Field (1997), Freeman (1993), Jennings (1994), Lever (1987), Low (1991a, 1997a), Marsden (1992), O'Connor (1972), Peratino (1979), Poulsen & Jepson (1996), Schmutz & Prus (1987), Smiet (1982, 1985), Stresmann (1914), Sujatnika *et al.* (1995), Waugh (1996a, 1996b), White & Bruce (1986).

Subfamily NYMPHICINAE

Genus NYMPHICUS Wagler, 1832

21. Cockatiel

Nymphicus hollandicus

French: Calopsitte élégante

German: Nymphensittich

Spanish: Cacatúa Ninfa

Other common names: Quarrior, Weero, Cockatoo/Crested Parrot

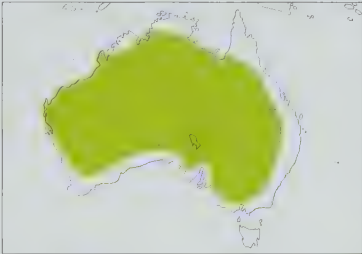
Taxonomy. *Psittacus hollandicus* Kerr, 1792, New Holland = New South Wales. Phylogeny has been in debate for many years: regarded by many authors as diminutive cockatoo on basis of morphology; during period 1963-1975 several workers put forward convincing case for its grouping amongst parrots of Platycercini; however, recent morphological and genetic studies, and particularly results of isozyme electrophoresis, have shown convincingly that species is closely related to the cockatoos, probably meriting separation in a monotypic subfamily or tribe within Cacatuidae. In past, genus name frequently given as *Leptolophus*, but this is a junior synonym. Monotypic.

Distribution. Irregular occurrence throughout interior of mainland Australia.

Descriptive notes. 33 cm; c. 80-100 g. Mainly brownish grey, with long tail and long wispy crest. Male paler below with forehead, chin, throat and cheeks yellow, enclosing orange ear-coverts; upperwing grey with white patch; underwing and undertail black; bill and feet grey; eye dark brown. Female has mainly grey head with slight yellow wash on face, and dull orange ear-coverts; white wing-patch; undersurfaces faintly barred with dark grey; undersurface of tail barred yellow and dark grey; outer tail feathers mostly yellow; bare parts as in male. Juvenile like female; some males gain bright face patch at c. 6 months old.

Habitat. Arid and semi-arid open country with water; savanna, open woodland, grassland, cultivation, and grain stubble.

Food and Feeding. Wide variety of small seeds, usually gathered from the ground but also from standing crops such as sorghum and sunflower (sorghum is preferred). Where abundant, native grass seed is eaten in preference to these crops. Feeds twice a day: shortly after sunrise, when the average weight of food eaten is 2.72 g (dry weight); and about an hour and a half before sunset, when the feed is larger 4.25 g (dry weight); daily average total of 7 g. Mean size of feeding flocks in one study was 27 birds.



Breeding. Usually Aug-Dec, occasionally as early as Apr. Nests on floor of a tree-hollow, generally in a tree near or in water; birds enter hollow tail first. 3-7 eggs; several clutches may be laid in a single season; incubation c. 20 days, by both sexes; chick has abundant yellow down; in captivity, nestlings remain in the hollow for c. 5 weeks. Fledglings mature quickly and soon become part of large nomadic flocks. Breeds readily in aviaries.

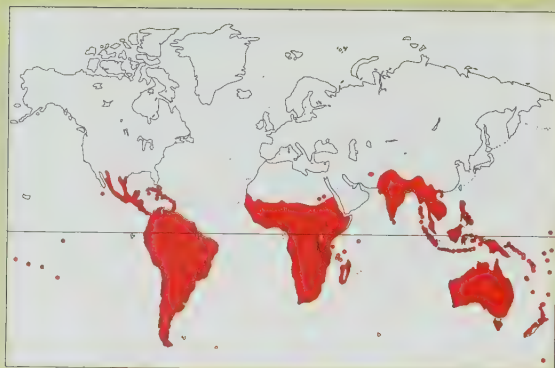
Movements. Strong flier. Outside breeding season, forms large, nomadic flocks that follow the seeding of native grasses and cultivated crops. Like most granivores, requires water, and in

times of drought flocks may even reach the coast. In S of range, tends to be more regular in movements, arriving to breed in spring but usually departing early in the new year.

Status and Conservation. Not globally threatened. Abundant. Large flocks may be regarded as pests by farmers growing grain; some are destroyed under permit. Unfortunately, to date no extensive field study of present species has been undertaken.

Bibliography. Adams *et al.* (1984), Blakers *et al.* (1984), Christidis & Boles (1994), Courtney (1974, 1983, 1996), Dühr (1997), Forshaw (1981b), Hobbs (1961), Jones, D.N. (1983, 1987), Lindsey, T.R. (1992), Macdonald (1988), Myers *et al.* (1988), Pizzey & Doyle (1980), Saunders & Ingram (1995), Saunders *et al.* (1984b), Schodde & Tidemann (1986), Simpson & Day (1996), Sindel & Lynn (1989), Smith, G.A. (1978b), Smith, G.T. & Moore (1992b), Trounson & Trounson (1987), Vriends (1979), Wells & Wellington (1992, 1993), Yamamoto *et al.* (1989), Zann (1965).

Class AVES
Order PSITTACIFORMES
Family PSITTACIDAE (PARROTS)



- Stocky, large-headed birds with powerful, short, curved, articulated bill, highly developed tongue and jaw musculature, and short legs; plumage exuberantly colourful in many species.
- 8-100 cm.



- Neotropical, Afrotropical, Oriental and Australasian, but only marginal in Nearctic and Palearctic; greatest diversity in tropics.
- Mainly forest; also woodland and savanna, with a few species in open areas.
- 78 genera, 332 species, 703 taxa.
- 86 species threatened; almost certainly 2 of these, as well as at least 9 more species and 8 subspecies, extinct since 1600.

Systematics

The parrots (Psittacidae) are one of two families within the order Psittaciformes, the other being the cockatoos (Cacatuidae). While the order itself is notably homogeneous, its affinities are unclear: there appear to be no close relatives. The traditional placement of the parrots between the pigeons (Columbiformes) and the turacos and cuckoos (Cuculiformes) is based on certain characters they share with each, such as a fleshy cere and frugivory (pigeons) and zygodactylous feet and frugivory (turacos and a few cuckoos). A link between the pigeons and the parrots has been proposed in Samoa's Tooth-billed Pigeon (*Didunculus strigirostris*), a species which has always vexed systematists, as reflected by its scientific name, meaning "little owl-billed dodo"; but while egg-white protein work, now discredited by its own authors, tended towards such a connection, DNA-DNA hybridization studies have suggested instead that the parrots might occupy a position somewhere between the cuckoos and the swifts, with the pigeons rather more distant.

Parrots have certainly been parrots for a long time. The earliest known fossil examples, given the name *Paleopsittacus georgei*, date from the Lower to Middle Eocene, roughly 40 million years ago. Their remains, found in deposits in southern Britain, reveal them to have been comparable in size to today's Senegal Parrots (*Poicephalus senegalus*) and apparently able to grasp objects in their feet, but poorly adapted for climbing among branches. The wing was probably longer than the Senegal's, but the flight less vigorous. There are few other Tertiary parrots, among them *Archaeopsittacus verreauxi* from the Lower Miocene of France, and *Conuropsis fratercula* from the Upper Miocene of North America; if the generic designation of this latter form is accurate, this is the oldest representative of a modern genus, indeed a genus that was still living at the start of the twentieth century (see Status and Conservation). Material attributed to at least two other modern genera, *Cyanoliseus* and *Aratinga*, is known from Quaternary deposits less than two million years old.

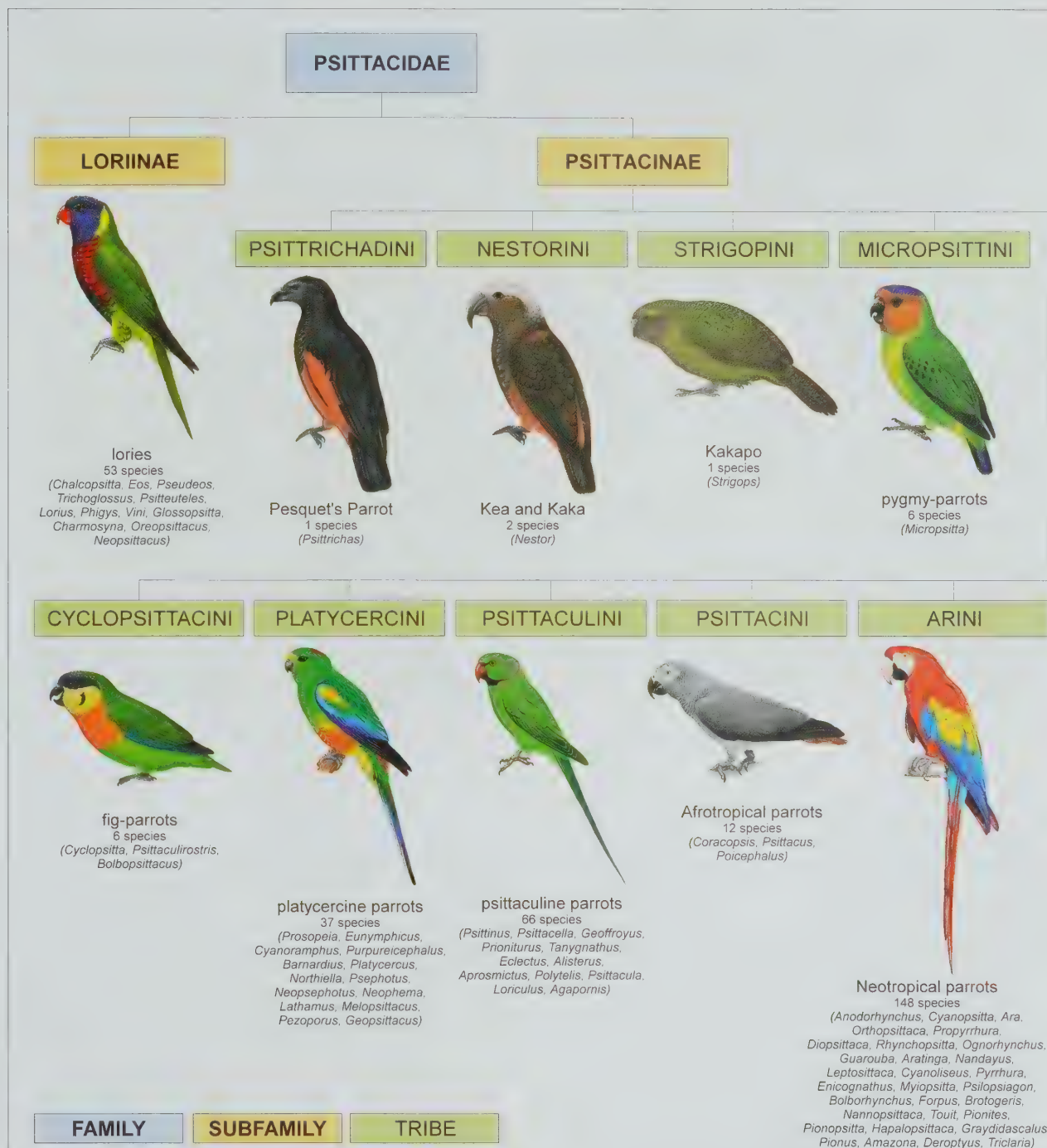
The very homogeneity of the Psittaciformes has caused considerable difficulty to systematists attempting to perceive clear patterns of relatedness between forms and groups. In 1891 Count Salvadori established seven families and divided the largest into six subfamilies, and his arrangement was largely backed by the osteological investigations of D. W. Thompson published in 1899. Although eight families, one with three subfamilies, were perceived by A. Reichenow 13 years later, when J. L. Peters reached the par-

rots in his *Check-list* he stood by Salvadori's basic arrangement, mainly just downgrading the higher categories to leave one family and six subfamilies. Some later workers reinstated familial status for some groupings: so although F. H. Glenny, using carotid artery structure as his guide, acknowledged only one family but nine subfamilies, R. Verheyen, on anatomical and ecological grounds, recognized five families and many more subfamilies, while J. Le G. Brereton, combining head-scratching habit with anatomical infor-



Within the subfamily Psittacinae, Pesquet's Parrot is the sole representative of the tribe Psittichadini. It is a very distinctive species, confined to the mountains of New Guinea. Its possible affinities have long been the subject of discussion and uncertainty. Some authorities have affirmed kinship with the lorries, based on its peculiar foraging habits and the shape of the skull. While it is generally recognized that the plumage pattern could link the species with the Nestorini, it has also been suggested that it shares a common ancestry with the cockatoos, although having probably branched off from the same stock before the Tertiary period.

[*Psittichas fulgidus*.
Photo: Kenneth W. Fink]





Australia and New Zealand are hosts to several rather peculiar genera, each comprising only one or two species, and often considered to be interrelated. The Ground Parrot of southern Australia is most closely linked to the Night Parrot (*Geopsittacus occidentalis*), which is sometimes lumped into *Pezoporus*. Through the Budgerigar (*Melopsittacus undulatus*) the Ground Parrot is related to the large Australasian tribe *Platycercini*, while through the Night Parrot it is sometimes linked to the Kakapo (*Strigops habroptilus*), although current opinion instead places the latter species in a different lineage, beside *Nestor*, these last two genera both belonging to New Zealand.

[*Pezoporus wallicus*.
Photo: Graeme Chapman/
Ardea]

This is a very high number of species for a non-passerine family, and the number of species generally recognized is likely to increase as distinctively marked subspecific isolates are elevated to species status, in line with modern trends in taxonomy and indeed conservation. One of the reasons why so many species exist lies with biogeography: the absence of primates in Papuaia is correlated with an astonishing "bloom" in nectar- and fruit-eating families of birds, bats and marsupials (see Habitat). However, life-history characters are also likely to play a role in psittacid speciation: the birds' clannishness and ability to recognize flock members, tendencies which must have strong survival values, may contribute to rapid evolution of morphological distinctiveness by reinforcing the effects of slight geographical isolation.

The lories and lorikeets, distinguished by their feeding habits and apparatus, comprise the genera *Chalcopsitta*, *Eos*, *Pseudeos*, *Trichoglossus*, *Psittuteles*, *Lorius*, *Phygys*, *Vini*, *Glossopsitta*, *Charmosyna*, *Oreopsittacus* and *Neopsittacus*. They appear to have arisen in New Guinea and radiated west as far as Sulawesi and Bali, south in the peripheries of Australia, and east through the Pacific as far as Henderson in the Pitcairn Islands. The most aberrant form is *Oreopsittacus*, represented by a single species, the Plum-faced Lorikeet (*Oreopsittacus arfaki*), whose consistent 14 tail feathers are almost unique throughout the *Psittaciformes*, which otherwise normally possess 12. The most successful species is the Rainbow Lorikeet (*Trichoglossus haematodus*), which has radiated through the eastern Indonesian archipelago, New Guinea, many western Pacific islands, and northern and eastern Australia; the forms in the Lesser Sundas are so distinctive that there is a strong case for breaking them into two or three separate species, a position strengthened by the Australians' near-unanimous decision to split their two forms into two species.

Recent work suggests that *Vini* is distinct osteologically from other genera of parrots except *Phygys*, which might better be treated within *Vini*. Previously there had been doubts as to whether *Vini* should not be merged in *Charmosyna*, and it has also been mooted that *Glossopsitta* might be combined with *Vini*, although new biochemical work indicates the former's proximity to *Trichoglossus*. The genera *Trichoglossus* and *Psittuteles* are very close and have been combined, but birds in the latter share certain characters, notably their small size and red crown, that are possibly sufficient basis for retaining their generic separation,

although Forshaw suspects that Goldie's Lorikeet (*Psittuteles goldiei*) may belong with *Charmosyna*.

Generally, members of the same genus within the *Loriinae* do not overlap geographically. Several *Lorius* do so in and around New Guinea; Red (*Eos bornea*) and Blue-eared Lories (*Eos semilarvata*) do so on Seram; Rainbow and Scaly-breasted Lorikeets (*Trichoglossus chlorolepidotus*) in eastern Australia; and Rainbow and Olive-headed Lorikeets (*Trichoglossus euteles*) in the Lesser Sundas. The only case where three congeners have been recorded together appears to be in the Marquesas, where the Ultramarine Lorikeet (*Vini ultramarina*) was the smallest and longest-surviving member of the genus, living sympatrically with two progressively larger but now long-extinct forms, *V. vidivici* and *V. sinotoi*.

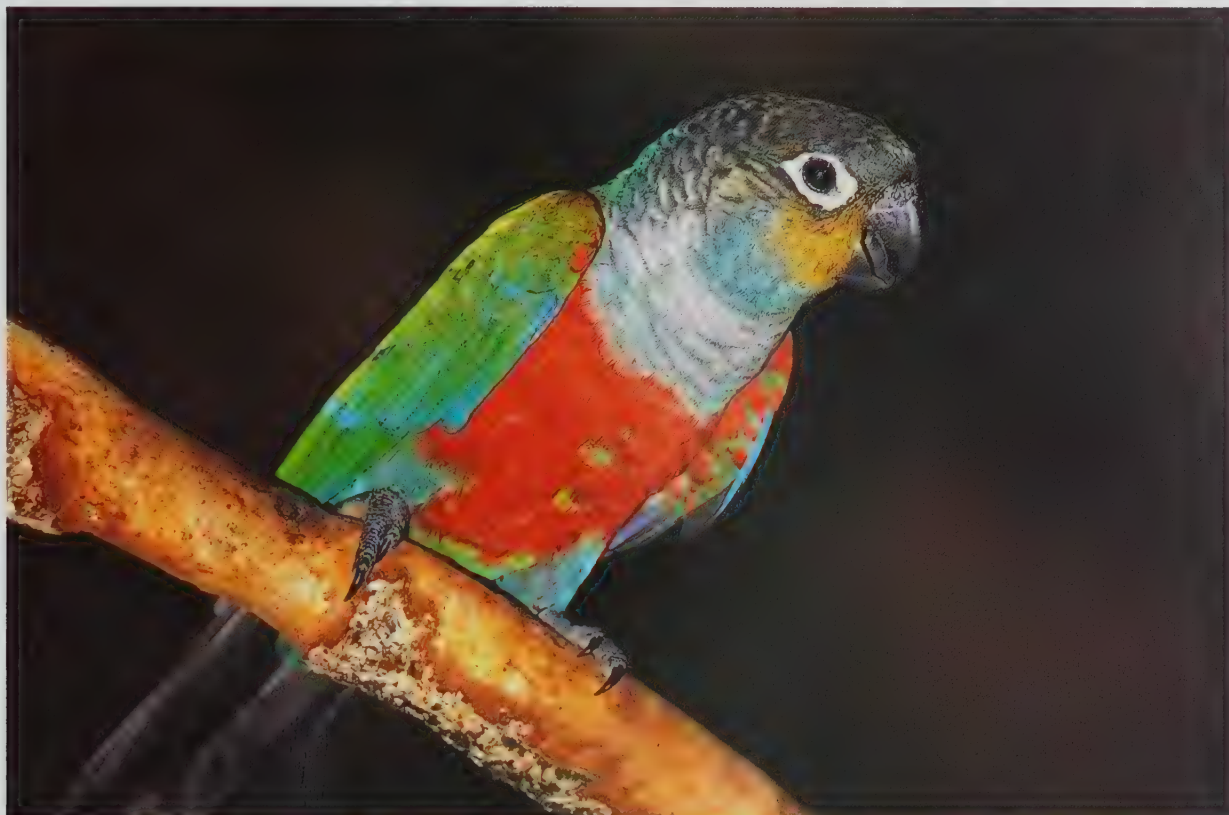
The *Psittichadini* consists of a single genus and species, the highly distinctive Pesquet's Parrot (*Psittichas fulgidus*), confined to the foothills and mountains of New Guinea. This bird has a hopping gait in the treetops and crane-peers when foraging, which is very similar to lory behaviour; moreover, the skull has been considered quite lory-like, although not all authorities agree on this point. Its affinities remain uncertain: in plumage pattern it shows some resemblance to the *Nestorini*, but it has also been suggested to have evolved from an ancestor common to the cockatoos, although in fact it probably branched off before the Tertiary development of ancestral cockatoo stock. J. M. Diamond remarked that its alternate rapid flaps and soaring are reminiscent of the New World's American Black Vulture (*Coragyps atratus*); certainly no other parrot is known to show such a flight pattern.

The *Nestorini* and *Strigopini* are restricted to New Zealand, although the former had recent representatives on the Norfolk Island group mid-way to Australia. *Nestorini* consists of a single genus, *Nestor*, with two extant species that replace each other altitudinally, the Kaka (*Nestor meridionalis*) dwelling in forests mainly in low-lying areas, and the Kea (*Nestor notabilis*) occupying wooded valleys and moorlands at higher elevations. Brereton placed the single representative of the *Strigopini*, the Kakapo (*Strigops habroptilus*), in the cockatoos on account of its direct head-scratching and other features, while Forshaw placed it after the Ground (*Pezoporus wallicus*) and Night Parrots (*Geopsittacus occidentalis*) on account of its terrestrial habit and barred plumage. Inevitably, however, its (original) sympatry with the *Nestorini*

The Crimson-bellied Parakeet has suffered the indignity of having its scientific name altered. The species was formerly listed as *Pyrrhura rhodogaster*, in reference to the bird's striking red belly. However, it was subsequently found that the older name *P. perlata*, until recently applied to the Pearly Parakeet (*P. lepidus*), was originally based on juvenile specimens of the Crimson-bellied, with the result that the name *P. perlata* is now correctly applied to this species; the name *P. rhodogaster* disappears as a junior synonym; and the name *P. lepidus* is introduced as the next oldest name for the Pearly Parakeet. All very confusing!

[*Pyrrhura perlata*,
Brazil.

Photo: Roland Seitre/Bios]



implies some ancient link, and a detailed review by B. C. Livezey has suggested its closest relative is the Kea. Nevertheless, anatomically it differs considerably, and on these, morphological and behavioural grounds the Kakapo remains easily the most unusual and remarkable member of the Psittaciformes.

The Micropsittini consist of six species of pygmy-parrot, all in the genus *Micropsitta*. These tiny creatures evidently originated in New Guinea, radiating into islands as far west as Buru in the Moluccas and as far east as San Cristobal in the Solomons. All six are to all intents and purposes allopatric, with one, the Red-breasted Pygmy-parrot (*Micropsitta bruijnii*), the species that has spread the widest east and west, being montane, the others being peripherally lowland forms.

The Cyclopsittini, which may be close to the Loriinae but differ in having the tongue deeply grooved and untipped with papillae, normally also figure as an Australasian tribe, with five species in New Guinea, two *Cyclopsitta* (one of which also occurs patchily in eastern Australia) and three *Psittaculirostris*, these two genera separated mainly on size and absence in the latter of elongated ear-tufts. However, on the basis of plumage and eye colour and bill and skull structure, the curious Philippine endemic *Bolbopsittaca* has also been considered a fig-parrot, an idea perhaps supported by one observation of birds creeping and swarming along vines and branches.

The composition of the Platycercini is currently in some doubt. Molecular evidence reveals a core of genera defining the tribe, namely *Platycercus*, *Barnardius*, *Northiella*, *Purpureicephalus*, *Psephotus* and *Lathamus*, the similarities of this last to the lorikeets being a matter of convergence. The same evidence has confirmed that the monotypic genera *Pezoporus* and *Geopsittacus* are close relatives of one another, but indicates that these two are also closely related to *Neophema* parrots and to the Budgerigar (*Melopsittacus undulatus*), not to the superficially similar Kakapo. However, these genera and *Cyanoramphus* do not sit easily with the core platycercines. Christidis and co-workers noted, too, the great genetic distance between the Blue-winged Parrot (*Neophema chrysostoma*) and Bourke's Parrot (*Neopsephotus bourkii*), suggesting that they are generically distinct, even though the latter is commonly lumped in *Neophema*. Thus, it may be that there were two successive radiations among the platycercines. The first involved the diver-

gence of *Pezoporus*, *Geopsittacus*, *Neophema* and *Melopsittacus*, while the second gave rise to *Platycercus*, *Purpureicephalus*, *Northiella*, *Lathamus* and *Psephotus*.

The proximity in this second radiation of *Platycercus* and *Psephotus* is suggested by the Western Rosella (*Platycercus icterotis*), which Forshaw noted as the same size as *Psephotus* and also sexually dimorphic, and with similar voice and flight. Whether, however, *Purpureicephalus* will be shown by molecular study to be as close to *Eunymphicus* as A. J. Cain rather surprisingly judged will be interesting to discover: he thought that the only two differences between them were the small crest and the unspecialized bill of the latter, neither of which stood as significant taxonomic characters, so he merged them.

M. Güntert's data on proventriculus morphology indicate that *Prosopaea* has the most ancestral condition among the platycercines, while D. Rinke concluded that the genus is connected to *Eunymphicus* and hence to *Cyanoramphus* and the platycercines via the primitive Masked Shining-parrot (*Prosopaea personata*), based on external morphology, including sexual dimorphism, and on biogeographical considerations. He pointed out that the Moluccan King-parrot (*Alisterus amboinensis*) populations on Peleng in the Banggai Islands may have resulted from early human introductions, so he rejected a connection with the king-parrots and the related genera *Aprosmictus* and *Polytelis*.

The 66 members of the Psittaculini, as constituted by Forshaw, are predominantly Asian. The exceptions are: the nine lovebirds, which are entirely Afrotropical; the Rose-ringed Parakeet (*Psittacula krameri*), which is Asian but extends into Africa via the Middle East; the Mauritius Parakeet (*Psittacula echo*) of its namesake island; the Orange-fronted (*Loriculus aurantiifrons*) and Green-fronted Hanging-parrots (*Loriculus tener*), which occur in New Guinea and associated islands; and the Australasian component represented by the genera *Psittacella*, *Geoffroyus*, *Eclectus*, *Alisterus*, *Aprosmictus* and *Polytelis*, which together comprise 16 species, although several of these extend into the Moluccas and Lesser Sundas and one, the Olive-shouldered Parrot (*Aprosmictus jonquillaceus*), is confined to the latter. Among the exclusively Asian species in the tribe are all members of the island genera *Prioniturus* and *Tanygnathus*, the monotypic Blue-rumped Parrot (*Psittinus cyanurus*), and altogether 23 members of *Loriculus* and *Psittacula*.



The Horned Parakeet of New Caledonia and the nearby Loyalty Islands is usually placed in its own monotypic genus, *Eunymphicus*. It has sometimes been lumped into *Cyanoramphus*, alongside a group of fairly similar, rather unspectacular species that range from New Zealand and associated islands north to New Caledonia itself, where an endemic race of the Red-fronted Parakeet (*C. novaezelandiae*) occurs. However, the Horned Parakeet differs notably from all of these species in having a very strange, slender crest. The race of the Loyalty Islands differs from the nominate in having the head almost wholly green, and six crest feathers as opposed to two; it may constitute a separate species.

[*Eunymphicus cornutus*
cornutus, New Caledonia.
Photo: Roland Seitre/Bios]

Once again there is little sympatry among congeners. New Guinea's *Psittacella* tiger-parrots overlap somewhat, but the two larger and the two smaller generally replace each other altitudinally. Two *Geoffroyus* also separate by elevation on New Guinea. The Philippines' Blue-crowned Racquet-tail (*Prioniturus discurus*) occurs alongside one of several species on Luzon and Mindanao, and there may be a handful of places where the Blue-naped (*Tanygnathus lucionensis*) and Blue-backed Parrots (*Tanygnathus sumatranus*) overlap, also in the Philippines. Clear-cut sympatry is most apparent on Sulawesi, where the large Maroon-rumped (*Loriculus stigmatus*) and small Green Hanging-parrots (*Loriculus exilis*) overlap; and on the Asian mainland, where, at least partly separating on size, up to four species of *Psittacula* parakeet co-occur in the Indian Subcontinent, Sri Lanka and Indochina. Nevertheless, even in this genus clear evidence of exclusion between species exists, the most remarkable instance being the complementary distributions of the Red-breasted (*Psittacula alexandri*) and Long-tailed Parakeets (*Psittacula longicauda*), the latter occupying peninsular Malaysia, Sumatra and Borneo, the former the rest of South-east Asia but also Java and some of the islands around Sumatra; the Red-breasted also leap-frogs from these Sumatran islands to the Andamans, leaving the Nicobars to the rather similar-plumaged but larger Nicobar Parakeet (*Psittacula caniceps*).

In the African lovebirds the only overlaps occur at the extreme fringes of the ranges of the four "white-eyed" forms, Fischer's (*Agapornis fischeri*), Yellow-collared (*Agapornis personatus*), Nyasa (*Agapornis lilianae*) and Black-cheeked Lovebirds (*Agapornis nigrigenis*); all these have often been regarded as a single species, freely hybridizing in captivity, as do the first two at Lake Naivasha, where escaped cage-birds commingle in free-flying colonies. However, their treatment as separate species follows a general trend towards recognizing distinctive allopatric forms which do not represent geographically restricted offshoots of more extensive parental stock. Thus, in the same way, the Slaty-headed (*Psittacula himalayana*) and Grey-headed Parakeets (*Psittacula finschii*) are here given species status, while amongst the hanging-

parrots the three forms united by Forshaw as *Loriculus amabilis* are also judged each to merit specific separation.

Christidis and co-workers concluded that the *Psittacella* tiger-parrots may belong with the platycercine parrots, possibly closest to the Ground and Night Parrots, and that the polyteline parrots *Alisterus* and *Polytelis* are in fact a sister group of the platycercines, a link previously suggested by Thompson and Verheyen. They found that *Eclectus* and *Geoffroyus* were closely related but could not determine their links to other genera, although a connection with the fig-parrots was judged possible. The genera *Psittacula* and *Agapornis* showed no link to Australo-Papuan parrots. It thus appears that the *Psittaculini* as here arranged may be polyphyletic, and further biochemical evidence is likely to disperse the tribe into several entirely different affiliations and lineages.

The *Psittacini* consist of three geographically related genera, *Coracopsis* of the Malagasy subregion plus the Afrotropical *Psittacus* and *Poicephalus*. These three are grouped together, in part because their relations to other taxa are not understood, and also because they share certain features, but whether they form a monophyletic group is not certain. The monotypic *Psittacus*, type species of the order, is a strikingly differentiated animal. On the basis of cranial osteology, it has been proposed that *Coracopsis* may be closest to *Geoffroyus* and *Lorius*, which would conform with the strong biogeographical links of the Malagasy subregion with Asian birds. The skull of *Poicephalus*, by contrast, suggests affinity with Neotropical *Pionites* and *Graydidascalus*, a far less likely connection; but also on external characters, superficial left carotids and scratching under the wing, these three genera have been considered possibly related.

The Neotropical Arini are, however, generally set apart from Old World parrots by several behavioural and morphological characters which strongly suggest their monophyly, possibly dating from the late Cretaceous. One or two distinctive monotypic genera which have not yet been subject to detailed analysis, notably *Graydidascalus* and *Triclaria*, might conceivably challenge this view, but in general the large array of Neotropical species is so uniform that only the one large tribe appears appropriate.

The most striking members are the macaws, on account of their great size and wonderful colours. For many years only three genera have been recognized, *Anodorhynchus* and *Cyanopsitta* for the blue macaws and *Ara* for all the others, ranging from birds as large as some *Anodorhynchus* down to ones a third the size and a tenth the weight. Two workers familiar with the smaller *Ara*, H. Sick and B. M. Whitney, have perceived differences that require the reinstatement of older genera to give expression to their distinctness. The morphology, voice and behaviour of Red-bellied (*Orthopsittaca manilata*) and Red-shouldered Macaws (*Diopsittaca nobilis*) return them both to monotypic genera, while the Blue-headed (*Propyrrhura couloni*), Blue-winged (*Propyrrhura maracana*) and Yellow-collared Macaws (*Propyrrhura auricollis*) fall neatly into a superspecies occupying the whole of their revived genus. The three Amazonian *Ara*, the Blue-and-yellow (*Ara ararauna*), Red-and green (*Ara chloroptera*) and Scarlet Macaws (*Ara macao*) are sympatric and, given that elsewhere the rarity of the Blue-throated Macaw (*Ara glaucogularis*) may well be related to competition from the Blue-and-yellow, the ecological separation of these three large forms needs fuller elucidation.

Propyrrhura and *Diopsittaca* have various characters, including flight behaviour and vocalizations, that suggest a greater proximity to the *Aratinga* parakeets than to the macaws, and both Smith and Sick have pointed out that an extreme lumper might even merge *Ara* and *Aratinga*, between which the only distinction is the former's naked lores, a difference that is not always clear-cut. There are other possible links, however. The seemingly anomalous *Rhynchopsitta* parrots of Mexico and *Ognorhynchus* of Colombia and Ecuador appear to be modified macaws (indeed the skulls of *Rhynchopsitta* and *Ara* are very similar), and these two genera closely resemble one another with their plush forecrowns, massive bills and pattern of colour distribution, as well as in their ecological specialization on one abundant (or formerly abundant) highland food. A captive *Ognorhynchus* proved to have a strip of bare skin at the base of the lower mandible, as in *Anodorhynchus*, and this patch flushed when the bird was excited, as in *Ara*. In terms of plumage col-

oration and possibly also co-operative breeding strategy, *Ognorhynchus* is connected with the lowland Amazonian *Guarouba*, which has commonly been placed in *Aratinga* although Sick believed it closer in behaviour to the true macaws.

The homogeneity of birds in the rather close genera *Aratinga* and *Pyrrhura* gives rise to substantial difficulties over species definitions. Some very similar forms of *Aratinga*, in the *holochlora* and *wagleri* complexes, seem likely to be over-split, at least by any standards that retain the *Trichoglossus haematodus* forms as a single species. *Pyrrhura* contains some equally brain-teasing taxa, notably the *leucotis*-*picta* complex, some of the outliers of which appear highly distinctive; the conservation status of this group might be enhanced by reducing the current species-limits boundaries. As with most *Loriculus* and *Agapornis*, there is relatively little sympatry between congeners. The widespread White-eyed Parakeet (*Aratinga leucophthalmus*) overlaps with certain other *Aratinga* in northern South America. However, in some cases of total overlap, as with Peach-fronted (*Aratinga aurea*) and Cactus Parakeets (*Aratinga cactorum*), there is almost total competitive exclusion from their different habitats. In *Pyrrhura* there are only a few instances of extensive overlap, such as between Painted (*Pyrrhura picta*) and Black-capped Parakeets (*Pyrrhura rupicola*) in south-east Peru, and Blue-throated (*Pyrrhura cruentata*) and Maroon-faced Parakeets (*Pyrrhura leucotis*) in south-east Brazil.

The monotypic genera *Nendayus* and *Leptosittaca* seem likely to be closely related to *Aratinga*, while *Cyanoliseus* and the genera *Enicognathus* and *Myiopsitta* show plumage characters suggesting relationship with *Pyrrhura*, although all are shaped more like *Aratinga*; *Cyanoliseus* and *Myiopsitta* appear close to each other. The Amazonian genus *Pionites*, which R. Low believes is monospecific, since its two members are identical in voice and behaviour, is on behavioural grounds close to *Aratinga* and *Pyrrhura* although commonly placed far from them in sequence. Similarly, the puzzling Amazonian *Derophtys*, which in contrast to *Pionites* is argued by B. M. Whitney to consist of two species rather than one, divided precisely like *Pionites* by the main course of the Amazon River, is regarded by R. Low as

Few bird families can rival the Psittacidae for exuberant coloration.

Not all its members, however, are brightly clad.

The Black Lory, for example, hardly corresponds to the popular concept of a typical tropical bird at all: a medium-sized parrot from western New Guinea,

it shows a glossy almost uniformly black plumage, making it look superficially somewhat crow-like.

Not even any of its bare parts, such as the bill, the naked skin round the eyes and the base of the mandibles, nor even the eyes nor the claws, show any contrast in colour to relieve its sombre livery.

[*Chalcopsitta atra atra*.
Photo: Dennis Avon/
Ardea]





The most dazzling part of a parrot's plumage is sometimes apparent only when it lifts its wings to reveal the underwing-coverts. The display may serve as a deterrent to rivals or most probably, in the case of the Kea, as a signal to conspecifics. Wing shape in parrots indicates in some measure their life style; the Kea's broad wings suggest it might be fairly sedentary. It does not, in fact, regularly fly long distances, only effecting limited seasonal altitudinal movements downwards in winter. A notable feature of this species is the elongated upper mandible which enables it to dig for roots, a valuable asset when other sources of food are scarce.

[*Nestor notabilis*, Arthur's Pass National Park, South Island, New Zealand. Photo: Tui De Roy]

close to *Pyrrhura*, differing only in larger size, louder voice and ornamental ruff, but being behaviourally identical; on the other hand, Smith noted that its bizarre threat display was exactly reproduced by *Aratinga solstitialis*! Low also notes that *Derophtys* and *Pyrrhura* share shaft streaking, absent in most other Neotropical parrots. Again, the skulls of *Pionites* and *Derophtys* show close similarities to *Aratinga* and *Pyrrhura*.

The relationships of the genera of smaller Neotropical parrots, both to each other and to other genera, are confused. *Forpus*, *Psilopsiagon* and *Bolborhynchus* show indirect (overwing) head-scratching, which otherwise is an Old World trait. The two latter genera are usually merged, but are so different in the field (point-tailed *Psilopsiagon* showing undulating flight and readiness to perch, round-tailed *Bolborhynchus* neither) that they merit separation whatever the morphological and scratching similarities. Indeed, the plumage patterns of Barred (*Bolborhynchus lineola*) and Rufous-fronted Parakeets (*Bolborhynchus ferrugineifrons*) suggest some ancestral Andean link of *Bolborhynchus* to *Enicognathus*, while those of the Grey-hooded Parakeet (*Psilopsiagon aymara*) postulate a connection between *Psilopsiagon* and *Myiopsitta*. The genera *Forpus*, *Brotogeris*, *Nannopsittaca* and *Touit* are commonly placed in sequence, probably simply for being small, green species mainly confined to tropical forest, but detailed study may reveal very different connections.

The genera *Pionopsitta* and *Hapalopsittaca* are closely related, with a link possibly provided through the rather aberrant Pileated Parrot (*Pionopsitta pileata*), the only montane member of that genus. Morphologically these birds are in turn similar to the closely related *Pionus* and *Amazona*, each of which are so successful that they have a representative virtually throughout the mainland Neotropics from Mexico south to Argentina; in fact, *Pionus* only misses the Pacific slopes to the north and south. Apart from the macaws and *Psittacula* parakeets, amazons are the only parrots in which several congeners commonly co-occur, with three species together in many places, and four in the Amazon basin. The versatility of the genus is further demon-

strated by its colonization of every large, and many a small, island in the Caribbean; both Jamaica and the much smaller Dominica possess two amazons which overlap their forest ranges.

Two final deep-forest anomalies are the Amazonian *Graydidascalus* and the south-east Brazilian *Triclaria*. The former has a peculiarly modified spoon-like tongue, an erratic butterfly-like flight and, in captivity, an exceptionally gentle temperament, but it remains too little studied to be moved from its current presumed link with *Pionus* and *Amazona*. The latter is no less an enigma, a bird very active in twilight, which (in captivity) shows distress in temperatures above 18°C, catches insects in flight, and possesses a warbling song totally unlike any other Neotropical parrot. Both birds appear to be primitive forms for which survival has been related to adaptation to relatively narrow niches, flooded forest in the case of *Graydidascalus*, cool shaded valleys in the case of *Triclaria*.

Morphological Aspects

Several characteristics shared between the two families of the Psittaciformes are used to define the order, the most important of which is the structure of the bill and associated musculature. The bill is short but broad-based; with the upper mandible deeply decurved, fitting over the shorter, upward-curved lower mandible, and articulated with the skull through a cere around its base, allowing extensive movement of both mandibles; the tongue and jaw muscle structure is complex, diverse and highly developed, closely related to the great power and control needed in the handling and ingestion of food items. The head is always proportionately large and broad, the neck short. The feet are zygodactyl with granular scales, and the legs are almost invariably short. Plumage is rather hard, the feather tracts are sparse and the apteria accordingly prominent. The ventriculus, or gizzard, is weak in the Loriinae, which ingest mainly nectar and pollen, but highly developed and muscular in other parrots, which need to break down often extremely hard vegetable material.



A minute species, the Buff-faced Pygmy-parrot, is especially well adapted to its arboreal life. Thanks to stiffened shafts, the tail can be used as a prop as the bird climbs around in trees. The noticeably disproportionate length of the toes and claws affords the surest of grips, and the bill, as broad as it is long, provides the ideal precision-instrument required for searching out lichen and bark fungi, its preferred food items.

[*Micropsitta pusio pusio*, south-east New Guinea. Photo: Brian J. Coates]

There is a tendency towards the loss of the uropygial gland in Neotropical parrots. *Amazona*, *Pionus* and *Brotogeris* lack it entirely, which presumably means they rarely if ever bathe; and these three genera plus the African *Psittacus* and Malagasy *Coracopsis* have scattered powder-down patches, reaching their extreme manifestation in the Mealy Amazon (*Amazona farinosa*), for which the English and scientific names reflect the striking appearance of the powder in its plumage.

The size and coloration of parrots vary enormously. No other family of birds rivals the Psittacidae, with or without the cockatoos, for the range in these two parameters. The largest parrots are the elegantly tapered Hyacinth Macaw (*Anodorhynchus hyacinthinus*), which reaches 100 cm long and can weigh almost

1.7 kg, and the dumpy, flightless Kakapo, breeding males of which weigh up to 3 kg; incidentally, in the latter species both sexes show a remarkable and possibly unique degree of weight gain, in the order of 60-100%, prior to breeding. The smallest species are the pygmy-parrots, which are as short as 8 cm and weigh as little as 10 g, twelve times as small as the longest parrot and 300 times lighter than the heaviest; New Guinea's hanging-parrots are almost as small. The predominant colour is green, which can be very striking in captivity but serves as camouflage amidst canopy foliage, where many species feed. However, most species combine green with lesser quantities of red, and a good number of species abandon green altogether: the genera *Anodorhynchus* and *Cyanopsitta* are famously blue; the Blue-and-yellow Macaw speaks for itself; the Scarlet Macaw is red, yellow and blue; *Guarouba* bright yellow with green flight-feathers; Rüppell's Parrot (*Poicephalus rueppellii*) brown, yellow and blue; *Psittacus* pale grey and red; *Coracopsis* chocolate brown; *Psittichas* red and black; the Red Lory almost entirely bright scarlet; the Ultramarine Lorikeet deep blue and white; the Yellow Rosella (*Platycercus flaveolus*) yellow, pale blue and black; and so it goes on.

Members of the Loriinae are generally not sexually dimorphic, except for very slight differences in most *Charmosyna* and one or two other species, and marked differences in the peculiar *Oreopsittacus*; this genus and *Eos* have a distinctive immature plumage, but otherwise young birds largely resemble adults. In the much larger Psittacinae the situation is more complex, but in general differences between the sexes, if any, are slight, and this is generally true too of differences between adults and immatures, although there are distinct juvenile plumages in *Psittacula* parakeets and some platycercines. Few Neotropical parrots show any dichromatism, the main exceptions being *Forpus*, *Bolborhynchus*, *Psilopsiagon*, *Touit* and *Triclaria*. In Africa it is only obvious in three *Agapornis* and three *Poicephalus*, and in one of the latter, Rüppell's Parrot, the female is actually brighter than the male. In the Oriental genera it is mildly apparent in *Psittacula* and most *Tanygnathus*, partly expressed in these genera through bill colour, and in *Loriculus* on the basis of reduced red on the throat in females. Fig-parrots are considerably dimorphic in plumage, with the interesting addition of females being considerably heavier than males; elsewhere the norm is for males to be slightly heavier than females, although the reverse is true in lovebirds. Pygmy-

The Australian King-parrot shows a number of features that are characteristic of the Psittacidae in general. Apart from its resplendent plumage, there are obvious structural features, such as a large, broad head and a short thick neck, while the bill is small in proportion to the size of the bird. Roughly a third of all parrot species show some degree of sexual dimorphism. In the Australian King-parrot only the male has the stunning scarlet head, breast and underparts; the female is mainly green, with red confined to her lower breast and belly. Interestingly, the male does not fully acquire his brilliant plumage until the age of two and a half, though he is capable of breeding earlier.

[*Alisterus scapularis*, Lamington National Park, Queensland, Australia. Photo: David Hosking/FLPA]





It is in the platycercine parrots, and in particular those which Christidis and co-workers have recently determined to have platycercine rather than psittaculine affiliations, that the greatest dimorphism occurs. Indeed, the most spectacular sexual difference in plumage of any bird species is exhibited by the Eclectus Parrot (*Eclectus roratus*), in which the male is green with a coral orange bill and red flanks, and the female, originally thought to be a different species, is red with a black bill and either a deep blue abdominal patch or a yellow vent and tail, depending on subspecies. In lovebirds, lack of sexual dichromatism is coincident with colonial breeding, which is present in the "white-eyed" forms and the Rosy-faced Lovebird (*Agapornis roseicollis*), but apparently absent in the dimorphic Grey-headed (*Agapornis canus*), Red-headed (*Agapornis pullarius*) and Black-winged Lovebirds (*Agapornis taranta*). However, whether any correlation exists in the platycercine parrots between dichromatism and sociability seems doubtful. Most *Alisterus* and *Aprosmictus* conform in being dichromatic and solitary, with mature males very intolerant of one another, even killing rivals when kept together in captivity; on the other hand, some *Neophema* breed colonially. Eclectus Parrots certainly flock, although intriguingly they tend to form same-sex groups, and observations of these can give the impression of sexual bias in overall numbers.

Most platycercine parrots have an interesting feature, namely that females and juveniles have a light stripe on the underwing, while the males are black in this region. Presumably this has some hierarchical signalling value, given the predominance of sexual dimorphism in the tribe. Another feature, this time proven to have an important signalling effect, is the curious nape-spot found in the "core" platycercines. This is formed by the downy portion of nape feathers being very pale instead of dark grey. When fighting, the neck is a common target for attack, but when the nape feathers are erected the nape-spot is revealed, and this has the effect of reducing the intensity of the attack or stopping it altogether.

Many parrots have occasional abnormal plumages, with 18 species in 10 genera in the Neotropics alone having produced them, and several puzzling taxa, such as "*Pyrrhura hypoxantha*" and "*Tanygnathus heterurus*", are now known or adjudged to be aberrant forms of established species. However, despite such capacity for throwing up variants, only two species of parrot have distinct morphs: in some of its races the Papuan Lorikeet

parrots are also mostly somewhat dichromatic. *Psittichas* females lack a red smudge behind the eye. *Nestor* shows no real differences but male Kakas have longer bills than females. *Strigops* males, being a lekking species (see Voice), are very much heavier than females.



Structural peculiarities in plumage are rather rare in parrots. The Red-fan Parrot possesses elongated feathers, dark red edged with blue, on the nape and neck, and these it can erect to form a spectacular ruff framing the head, like a football fan showing off the colours of his favourite team! This posture gives the impression that the head is much bigger, and may be used as display or an expression of alarm or as a threat. Red-fan Parrots spend most of the daytime feeding in the forest tree tops, and they often perch on prominent dead branches rising above the tree canopy, where they can appear singularly raptor-like, a resemblance reflected in the specific name.

[*Deroptyus accipitrinus* accipitrinus.
Photo: Francisco J. Erize/
Bruce Coleman]

The exotically plumaged Collared Lory, lone member of the genus *Phigys*, is a small, sturdy parrot restricted to Fiji, where it feeds on flowers and fruits in forests, plantations, and even trees in towns and villages. The species owes its common name to the elongated feathers covering the hindneck and upper mantle, which the bird is able to ruffle, though not erect. The splendid red, green and blackish purple feathers have long been used for decoration by islanders in nearby Tonga and Samoa, but although captive birds escape there occasionally, no breeding population has ever been established outside Fiji.

[*Phigys solitarius*, Fiji.
Photo: Jean-Paul Ferrero/
Ardea]

(*Chamosyna papou*) possesses a beautiful melanistic morph, which predominates at various places and altitudes in New Guinea; while the St Vincent Amazon (*Amazona guildingii*) has a green morph which occurs at a high frequency on the island's windward side. Interestingly, this latter appears to have a higher-pitched voice than the preponderant bronze morph, but it hardly seems probable that this is evidence of a speciation process.

Although the plumages of parrots vary wildly, their basic physical structure is relatively uniform. In the past, the presence or absence or degree of notching on the cutting edge of the upper mandible was considered an important taxonomic feature, but this now seems unlikely. Although evolved in, and for the most part confined to, wooded habitats, many parrots descend to the ground as a normal element of a daily or annual routine, and those that are highly adapted to terrestrial life are not greatly distinct from the rest in their leg morphology. No parrot has a movable crest like the cockatoos, but the *Vini* and *Phygys* lorikeets can ruffle the feathers of their crown and nape respectively. *Eunymphicus* has immovable crest feathers, and the Red-fan Parrot (*Derophtus accipitrinus*) possesses a splendid erectile ruff. However, it is more in the shapes of the wings and tail, and the related bulk of the body, that parrots show their differences.

As a broad but breakable rule, parrots that undertake long daily flights are more streamlined in body, with narrower wings and longer tails. Those with more rounded wings and short tails tend to move over shorter distances. Most parrots fly with rapid, rather shallow wingbeats, the amazons in particular being notable for not bringing their wings above the level of the body; but the flight patterns are very variable, with many combinations of speed, undulation, directness, gliding, and so on. Perhaps the most aerodynamic of all parrots is the Swift Parrot (*Lathamus discolor*), which not only migrates on a seasonal basis from Tasmania to the Australian mainland, but feeds, like lorries, on flower products, and therefore needs to be constantly ranging for new sources of energy. However, many sedentary parrots have remarkable powers of flight, both in terms of speed, possibly as an anti-predator insurance, and of endurance: the *Pyrhura* parakeets of South America are known locally as *torpedos* for the incredible velocity and agility with which they flash through the air below the canopy of the forest, while Brown-necked Parrots (*Poicephalus robustus*) routinely travel

80 km a day from roost-sites to foraging areas. Even the short-tailed, chunky Grey Parrot (*Psittacus erithacus*), which is adapted, like *Poicephalus*, for covering large distances, is fast, in normal direct flight making about five wing-strokes per second, 300 per minute: three birds were timed at 63–72 km per hour over a 300 m stretch. *Geoffroyus* parrots have a curious trait when they land on a branch of appearing not to brake from their normal swift over-forest flight.

In trees, parrots generally move with slow deliberate movements, often turning their feet inward to grasp a branch as they move along it, thus shifting the body from side to side with each step. As they manoeuvre in the outer reaches of the canopy they commonly use their bills as an extra grip. When hanging-parrots climb an upright branch, they spiral up it taking long alternate strides of 15 cm or more, the whole body swinging through almost 180°, the bill used as aid in pulling up, and the tail working as a prop. On the other hand, the Yellow-billed Lorikeet (*Neopsittacus musschenbroekii*) has a distinctive rodent-like running action as it moves along branches in the middle and upper storeys of trees, and the newly described Amazonian Parrotlet (*Nannopsittaca dachilleae*) has been seen in flocks in bamboo, creeping about like a small arboreal mouse, making no sound.

On the ground, parrots walk with a rolling gait, but the more terrestrial species, even the Kakapo, are capable of running with agility and without the rolling gait; Night Parrots otherwise tend to hop, and pygmy-parrots, which generally creep about on trunks and branches, will occasionally leap like jumping jacks for several feet from one limb to another.

Clear evolutionary adaptations within parrot groups are not always obvious. The Loriinae are distinguished foremost by the structure of the tongue, which is elongated and tipped with erectile epidermal papillae that form a brush-like appendage for efficient feeding on nectar and pollen; interestingly, the non-loriine Swift Parrot and Philippine Hanging-parrot (*Loriculus philippensis*) have similar but separately evolved structures. In conjunction with the specialized tongue, lorries have the bill relatively long and narrow, while the plumage is tight and glossy, possibly as an adaptation to life spent foraging among nectar-rich vegetation. Pygmy-parrots have structural features reflecting their evolution to forage on bark surfaces: the tail is short with stiff projecting shafts, as in many tree-climbing birds; the toes are disproportionately long; and the

Unless constant chattering betrays their presence, Red-flanked Lorikeets can easily escape detection on account of their small size and mainly green tones which help to conceal them in leafy trees. Sexual dimorphism is pronounced in this species: the mainly green female lacks the vivid red and blue of the male, but instead boasts bold yellow streaking on the sides of the head. The characteristic perching grip of parrots is well illustrated in this pair; two toes point forwards and two backwards. This zygodactyl arrangement promotes great versatility of movement, enabling parrots to move easily about both on the ground and in trees.

[*Chamosyna placensis*.
Photo: Dennis Avon/
Ardea]





The mainly arboreal lories are specialized feeders, drawing their nutriment chiefly from flowers in the form of nectar and pollen. The elongated tongue is amazingly adapted to harvesting this kind of food: the small erectile papillae on the tip permit the minute pollen grains to be brushed into the mouth, where they are compressed into small balls and then swallowed. For this reason, these species are sometimes known as "brush-tongued" parrots. Normally the papillae lie flat, and only become visible when the tongue is extended, as in the case of this Rainbow Lorikeet busy feeding on blossoms of the scarlet bottle-brush tree (Myrtaceae).

[*Trichoglossus haematodus moluccanus*, Australia.
Photo: Roland Seitre/Bios]

claws are long and curved. Also, there is a very prominent notch in the compressed upper mandible so that the bill resembles that of a miniature cockatoo, the proventriculus and ventriculus are very muscular, and the salivary glands are well developed, all of which may be adaptive to specialization as grazers of fungi and lichen off trunks and branches.

Loss of feathers on the head has evolved twice in the parrots: Pesquet's Parrot is a specialist feeding on soft fruit, and its distinctive baldness must be a response to the danger of feathers becoming matted with drying pulp; the same is presumed to be true of the Vulturine Parrot (*Pionopsitta vulturina*) of Amazonia, which loses its facial feathering as it becomes sexually mature, although its food and feeding behaviour appear never to have been recorded. The variably sized bare facial area on different macaws may also have originated as a defence against fruit matting, although in some species its ability to flush red as a signal of a particular state may now be its main function.

The convergent structural appearances of Andean *Psilopsiagon* and Australian *Melopsittacus* have long been noticed, both having rather pointed wings and long tails associated with wandering movements in search of their grass-seed food, and small, compressed bills for effective foraging when they find it. Similar such bills are found in the seed-eating *Neophema* and *Psephotus*, and the Ground and Night Parrots of Australia. The plumages of the south-west Pacific's *Cyanoramphus* parakeets and the southern Andean *Enicognathus* are also strikingly similar, and as both genera occupy austral beech forests there might be parallel selection pressures favouring dull green plumage with a narrow red frontal band. One of the *Enicognathus* species has a remarkable elongate upper mandible, apparently used to extract seeds from *Araucaria* cones, although a clearer explanation of this adaptation is needed, given that other parrots take the same seeds. An equivalent development exists in south-west Australia's Red-capped Parrot (*Purpureicephalus spurius*), which has a long upper mandible used to extract seeds from the fruits of marri (*Eucalyptus calophylla*). Other genera with relatively long upper mandibles are *Nestor*, *Loriculus*, *Nannopsittaca* and *Brotogeris*.

Undoubtedly the most extreme and interesting modification of any psittacine is found in the Kakapo, the world's only flightless parrot, and one of the few exclusively nocturnal ones. All of its distinctive anatomical features stem from its loss of flight, which

caused it to combine characteristics of an ecological generalist and an evolutionary specialist: life on the ground in a highly seasonal environment, where high-quality food such as seeds is not permanently available, was an evolutionary breakthrough which could only be sustained by increasingly generalized feeding. Its voluminous crop thus retains large quantities of food consumed during its nightly foraging; to compensate for a low-quality diet the bird has this capacity to ingest more and its digestive tract is accordingly large, and while it has smaller pectoral skeleton dimensions than the Kea, its pelvic dimensions are larger. The facial filoplumes of *Strigops*, also found in Australia's Night Parrot, are an adaptation



Among the few parrots that diverge from the norm in showing plumage adornments, the six racquet-tailed species found in parts of Indonesia and the Philippines are outstanding. The two central tail feathers have bare shafts terminating in spatules, or racquet-shaped tips. In the Blue-crowned Racquet-tail the length of these racquets constitutes the only external evidence of sex distinction, the female's being substantially shorter than the male's.

[*Prioniturus discurus*, Philippines.
Photo: Günter Ziesler]

to nocturnal foraging. Flightlessness has commonly evolved in the absence of mammalian predators, but the Kakapo's cryptic, nocturnality and general stealth (although slow movements presumably result from its low-protein diet) are consistent with adaptations for the avoidance of avian predators, which New Zealand once possessed in greater number.

Several other species of parrot are nocturnal, and many more appear to be partially so. The eyesight of parrots appears to be very acute, but whether nocturnal and crepuscular birds have a developed sense of smell to assist with foraging appears to be unstudied. Musk Lorikeets (*Glossopsitta concinna*) certainly give off a distinctive smell, but it is not known if this is sensed by the birds themselves or what selective advantage it might confer. The hearing of parrots must be highly developed, given the general noisiness of flying birds, which clearly represent important signals not just internal to the flock but to other conspecifics in the area.

Parrots undergo a complete moult once a year. The first such moult in young birds takes place at around 7-10 months of age, bringing them roughly into synchronization with adults, which generally moult immediately on completion of breeding. As an apparent exception and presumably as a strategy for rapid utilization of vanishing resources, Budgerigars can moult and breed at the same time, with no increase in intensity of the former following breeding; in one individual, a complete moult cycle took 6-8 months. At the other end of the size scale, nesting macaws delay moult only until the young leave the nest, and so tend to look much more ragged than their offspring or non-breeding birds. The moult of the primaries in all parrots takes several months, starting in the centre and proceeding in both directions. In the Loriinae and most Psittacinae it starts with the sixth, but in the Nestorini, Micropsittini and Strigopini another primary may be the first out. Secondaries are replaced in a general descending sequence, but tail moult, which usually commences only when wing moult is well advanced, is too little studied to establish any rule; it is apparently chiefly irregular, but strictly centrifugal in the Budgerigar and symmetrically in the sequence T1, T5, T6, T2-T4 in the Burrowing Parrot (*Cyanoliseus patagonus*). Body moult appears to start and end within the time-frame of a complete wing moult.

In many species some guide to age can be gauged from iris colour. Indeed, in species with no clear juvenile plumage this may be the only simple indication of age. In Grey Parrots, for example, the iris is black up to 3-4 months, but then begins to pass through all the stages of grey, being very pale at the end of the first year. In the following two years a hint of yellow slowly develops in the pale yellow, and by four years of age, when birds are sexually mature, the iris is always yellow, usually pale. It continues to develop in intensity, and in old breeding birds of around 18 there is almost an orange tint to be seen. It may perhaps be that the widespread agonistic and epigamic use of "eyebrazing" in parrots (see Breeding) evolved as a means of birds showing their age and hence status.

Habitat

The zygodactyl feet of parrots are an indication that they evolved in forested habitats, and forested habitats remain their prime home. A small percentage of the family range into open habitats, and five Australian and Antipodean forms, the Night, Ground and Rock Parrots (*Neophema petrophila*), the Antipodes Parakeet (*Cyanoramphus unicolor*) and the Antipodes race of the Red-fronted Parakeet (*Cyanoramphus novaezelandiae*), have dispensed with trees altogether. However, the vast majority are tied to forest, woodland and savanna. For the most part these habitats lie within the tropics, but the birds have also penetrated temperate areas: to the north, including a few species such as the Derbyan Parakeet (*Psittacula derbiana*) and the extinct Carolina Parakeet (*Conuropsis carolinensis*); and to the south, many species, including some of the morphologically most modified, such as the Slender-billed Parakeet (*Enicognathus leptorhynchus*) in Chile, the Red-capped and Swift Parrots in Australia, and the Kea and Kakapo in New Zealand. However, the critical factors for the presence of parrots everywhere are two. The first is food, which is for the most part supplied by trees. The second, in many ways more crucial still, is nest-sites, which are for the most part supplied by old trees: conservationists are discovering that the

The peculiar structure of the bill that is common to all Psittacidae makes their identification as parrots a particularly simple matter. However, bill shape and size vary widely among the species, each one specially adapted to meet the bird's feeding requirements. The Blue-naped Parrot shows a very heavy, powerful bill, which enables it to deal with all sorts of fruits and seeds of forest trees, including even young coconuts. The disproportionately large size of the bill, short tail and characteristic thick parrot neck all combine to give this species a noticeably top-heavy look.

[*Tanygnathus lucionensis*,
Philippines.
Photo: Günter Ziesler]





The size and shape of a parrot's wings are usually indicative of its lifestyle. In general, those with broad, rounded wings habitually cover only short distances, mainly to feed, while those with longer, narrower ones may forage much further afield. In the latter category, flocks of Blue-and-yellow Macaws leave the roosting sites in early morning, bound for their feeding grounds; after a long day there, they only begin the return flight shortly before sunset. It is interesting to note that even within a flock pair members maintain their bond by flying close together, with the wings almost touching.

[*Ara ararauna*,
Das Emas National Park,
Goiás, Brazil.
Photo: Günter Ziesler]

local decline or extinction of many sedentary parrots from ostensibly "good habitat" is directly related to the decline and loss of nesting opportunities, which is as much to say that habitat without nest-sites is not habitat at all. The inability of the Monk Parakeet (*Myiopsitta monachus*) to colonize perfectly good foraging habitat in the absence of tall structures in which to build its stick nests is a very obvious instance of this.

If lowland tropical forests contain the greatest diversity of tree species on earth, it is hardly surprising that they should also hold the greatest diversity of parrots. As nectarivores and especially frugivores, parrots capitalize on the huge array of different flowers and fruits borne by the multitudinous kinds of rain forest tree, but of course these products fall into many different classes of size and accessibility, requiring specializations to make them profitable to consume, and consequently many different parrot species have evolved to occupy the many different niches created by the food supply. Thus in his tropical rain forest study area in northern Mato Grosso, Brazil, P. Roth regularly found 16 parrot species, five macaws (four *Ara* and *Orthopsitta*), two *Aratinga*, two *Pyrrhura*, a *Brotogeris*, a *Pionopsitta*, a *Pionus*, a *Touit*, two *Amazona* and *Derophtus*. Five of these species fell into the weight band 50-140 g, four into that for 140-360 g, four into 360-950 g, and three into 950-1350 g. Just from these simple figures it starts to become clear how the species might be partitioning the habitat through foraging specialization.

Under certain conditions, the psittacine carrying capacity of rain forest increases still further. Alfred Russel Wallace, referring to the islands extending from Sulawesi to the Solomons, wrote: "The area of these islands is probably not one-fifteenth of that of the four tropical regions, yet they contain from one-fifth to one-fourth of all the known Parrots". One explanation of this phenomenon, which is also expressed in the great increase in the number of pigeons and the *in situ* evolution of the birds-of-paradise, is that no continental Asian mammalian, and in particular primate, frugivores were able to gain access to the islands across the deep water channels that form the biogeographical barrier to the Wallacean and Australo-Papuan regions. Thus where Roth had 16 parrots in lowland Amazonia, P. Gregory has listed no fewer than 27 (plus two cockatoos) for a small upland site in the very heart of New Guinea. So, just as nest-sites can place limits on individual species' populations, it may be that the presence of

mammalian and other food competitors places limits on parrot species richness in tropical forests.

Some species of parrot have become increasingly emancipated from natural forest products to supply their needs, switching to cultivated crops and plantation fruits instead. Once again, such changes complicate the definition of their habitat. The Long-tailed Parakeet is commonly classified as an endemic Sundaic "rain forest" bird, and its range suggests a close link with this habitat, but it thrives in Peninsular Malaysia owing to its ability to forage outside forest and to nest communally inside it, the latter being an exceptionally rare trait in Sundaic forest species; this combination allows the species to occupy quite small forest remnants, in contrast to the identically distributed Blue-rumped Parrot, which, as a typical and "true" rain forest species of the region, is losing ground fast. However, adaptation to, or occupation of, modified habitats is not necessarily a cause to relax one's concern over habitat loss: densities of some parrots in primary forest may be double what they are in secondary forest, when these in turn are double what they are in agricultural scrub and parkland.

One further emancipation amongst smaller parrots has been the replacement of trees with termitaria, chiefly arboreal ones, for nest-sites. Termitaria are abundant and relatively easy to excavate, so nest-sites are not a limiting factor in the *Microsittini*; some members of the Australian genus *Psephotus*, which use terrestrial termitaria; and the Neotropical genera *Aratinga*, *Brotogeris*, *Touit* and *Forpus*. However, the apparent coincidence of the ranges of the Orange-fronted Parakeet (*Aratinga canicularis*) and the termite *Nasutitermes nigriceps* suggests a possibly obligate relationship which binds the parrot to the conditions appropriate for the insect.

Other factors which may define a parrot's habitat in a broad sense are roosting sites, water and minerals. Roost-sites are often the same holes in trees that the birds nest in at another stage of the year, so again the absence of sufficiently old trees may be problematic for habitual hole-roosters. Most species roost communally, however, and will travel considerable distances to participate in this important behaviour. Many sites are traditional, and while it is generally assumed that the populations using them simply shift elsewhere when the areas are disturbed or destroyed, there may well be some significant detrimental impacts which only detailed study could detect. The importance of water is more

Unmistakable on account of its startling coloration and large size, the Red-and-green Macaw must be amongst the most familiar of all tropical birds, mainly thanks to zoos and tourist promotions, though relatively few people will experience the thrill of actually seeing the bird in the wild. With the other large macaws it shares the same flight silhouette of long narrow wings and long graduated tail, a streamlined shape reflecting the fact that these birds may undertake lengthy journeys as they commute to and from their feeding grounds every day. The wingbeats are shallow, but flight is strong, direct and surprisingly fast for such large birds. Though the plumage seems almost entirely red, especially when viewed from below with the wings raised, the flight-feathers are mainly blue on the uppersurface, and the upperwing-coverts red, green and blue, but these features are generally only visible when the bird is perched or glimpsed from above in flight. A notable feature of the Red-and-green Macaw is the extensive area of bare white facial skin, the upper portion holding thin regular lines of small red feathers, which, along with the slightly darker tone of red, help to distinguish this species from the Scarlet Macaw (*Ara macao*), when the markedly different upperwing-coverts are not visible.

[*Ara chloroptera*.
Photo: Stephen Dalton/
NHPA]





expanded their ranges as cattle-ranching has extended into the arid interior, the birds profiting from the dams and troughs put out for the livestock; in Africa, Rüppell's Parrot has at least maintained its numbers through the same means, even coming to drink at farmstead swimming pools in the driest parts of the year. As for minerals, the situation is unclear: the celebrated Amazon clay-licks attract so many species on a daily basis that the impression is certainly one of necessity. However, the same species appear to dispense with the habit in other parts of their range, and elsewhere in the world relatively few species have been recorded in similar behaviour, with, for instance, a noted one for Grey Parrots in the Central African Republic. In conclusion, then, it would appear unlikely that such sites form an essential component of any parrot's habitat: their value may lie in permitting parrots to take still unripe fruit and thereby gain an advantage over non-psittacid food competitors in the region (see Food and Feeding).

The dispersion of all these elements, food, nest-sites, roost-sites, water and mineral licks, within general habitats has contributed to the extraordinary ranging behaviour of many parrot species, involving many kilometres of travel each day in search of particular things that meet their needs. However, the birds' "habitat" cannot safely be defined merely in terms of those needs. Inevitably, the entire ecosystem in which the "essential" items are located is likely to contribute to the presence of such needs. Fig-parrots may only need fig-trees, but fig-trees, for whatever reason, need forests; therefore fig-parrots need forests. All parrots may need old trees for nesting, but old trees cannot exist without having been young; so all parrots need young trees too. Parrots ranging sometimes vast distances over forest or grasslands are thus not expressing independence of the lands passing beneath them any more than a snail is when crossing the garden path from one cabbage to another.

In a few cases, of course, monocultural stands of a single plant appear to supply virtually all the needs of a particular species, as with the pines used by the Thick-billed Parrot (*Rhynchopsitta pachyrhyncha*); wax palms (*Ceroxylon*) by the Yellow-eared Parrot (*Ognorhynchus icterotis*); licuri palms (*Syagrus*) by the Indigo Macaw (*Anodorhynchus leari*); and buriti palms (*Mauritia*) by the Red-bellied Macaw. Even here, however, there is some danger of assuming an absolute link, since each bird may at least occasion-

This Senegal Parrot vividly demonstrates some of the processes involved when a parrot flies in to land on its perch in a tree or bush. The tail is fanned out and the wings held or flapped almost vertically, as the bird presents maximum possible wind resistance in its attempts to brake. At the same time, the feet are slung forward and opened, ready to grasp the branch. A considerable degree of co-ordination, balance and timing are essential, and the whole process tends to happen so fast that its various components may scarcely be perceived by the human eye.

[*Poicephalus senegalus versteri*.
Photo: Kim Taylor/Bruce Coleman]

obvious: in particular, parrots that specialize on cone, herb and grass seeds appear to need to drink regularly, and the presence or absence of water in otherwise food-rich areas defines their ability to exploit the resource. In Australia, several species have



Parrots evolved in forests and they remain heavily dependent on trees to satisfy their needs. Over time, though, many species have adapted to changes in their environment and some have learnt to exploit the rich sources of food offered by man and his farming practices. The Malabar Parakeet, for instance, is a native of tropical evergreen and moist deciduous forests in western India, but it has had to adapt to living in various forms of secondary forest, cultivated clearings in forest, and abandoned coffee and rubber plantations, all habitats modified or even created by man's activities.

[*Psittacula columboides*,
Anamalai Wildlife
Sanctuary, Tamil Nadu,
southern India.
Photo: Gertrud & Helmut
Denzau]

Commonly thought of as birds exclusively of tropical forests, the Psittacidae do number a few species of temperate regions, notably the Kea, a mainly ground-dwelling species of the mountains of New Zealand's South Island. Seasonally, the species occupies habitats at different altitudes, in spring moving up from wooded valleys and Nothofagus forests into subalpine scrubland and grassland, where it remains in summer. It climbs even higher in autumn in search of berries, but when winter arrives snow normally forces it down below the tree-line, although birds are often seen playing in the snow near ski lodges.

[*Nestor notabilis*,
Fjordland National Park,
South Island, New
Zealand.
Photo: Doug Wechsler/
VIREO]



ally use other food resources, while the Indigo is one of the few psittacids of the world that needs, or at least only now uses, cliffs in which to breed, others including the Maroon-fronted Parrot (*Rhynchopsitta terrisi*), Burrowing Parakeet, Cliff Parakeet (*Myiopsitta luchi*) and *Psilopsiagon* parakeets of the New World, plus the Rock Parrot of Australia. Moreover, the ranging behaviour of these birds may not be greatly reduced in comparison with species with requirements that are met by dispersed resources inside more complex vegetation, because the annual spread of food which the plants produce, and without which the parrots could not survive year round in the habitat, results in a patchy and unpredictable distribution of the resource, requiring constant searching and monitoring by the birds.

Precisely because of the distances parrots cover, little is yet clear about the size of their home ranges, or indeed how to define such things. Radio-tracking evidence is still in its infancy but this and observational work suggest that daily journeys of 30-40 km are not unusual, depending on the size and structure of the parrot. Only for the very sedentary Ground Parrot, however, are there any precise figures, and for a bird that spends most of the day foraging on foot the values are, unsurprisingly but very untypically, low: home ranges in south-east Australia average 8.7 ha (range 2-20 ha), with subadults (14 ha) having larger ranges than adults (6 ha). These ranges overlap extensively, but at any given time individuals are well separated when foraging, the average distance between birds being 100 m.

Habitat governs social systems and population regulatory mechanisms in ways which are only very vaguely understood. In Australia, social patterns, behaviour and voice are thought to be relatively simple where resources are generally abundant or at least in fairly constant supply, becoming most complex where resources are variably abundant (in other words fluctuate within an area without ever entirely exhausting), and reverting to relative simplicity again as resources continue to decrease to the point where they are temporarily lost from an area. Species that flock the least, such as king-parrots, tend to be "steady-state" habitat dwellers, either in closed rain forest or open treeless grasslands; they are seemingly solitary and territorial, and with less developed vocabularies. Species that flock the most consistently throughout the day and year, such as the Budgerigar, tend to be largely nomadic or highly seasonal savanna forms for which cohesiveness in optimizing foraging

and breeding ability requires limited social structure and thus again less developed vocabularies. Species that form considerable flocks in parts of the day and year and which require information on a daily basis about new foraging areas, but which generally breed as solitary pairs, such as rosellas, appear to create more complex social hierarchies and develop the broadest vocabularies.

Most parrots, of course, fall into this last category. Even rain forest resources are generally not constant, and the gregariousness and garrulity of African Grey Parrots and Neotropical amazons, from whose ranks the best talkers come, presumably bear witness to this fact. The main edible resources available to frugivores in forests are in the canopy, where the brilliant greens and other colours of parrots mix well with the various-coloured new leaves, buds, flowers and fruit that grow there. Those parrots that have adapted for life in the subcanopy appear to be the "steady-state" animals with the less social behaviour, such as the sluggish *Psittacella* tiger-parrots of New Guinea, the anomalously dull *Coracopsis* parrots of Madagascar and *Triclaria* of south-east Brazil.

As noted above (see Systematics), despite the great number of parrots in the world, the sympatric occurrence of congeners is relatively infrequent. This is basically because same-sized congeners are likely to have same-sized bills, and hence their ecological overlap will be too great for toleration. When it does happen, therefore, there is commonly some difference in size, or else in altitude or foraging station. Thus, with the four tiger-parrots one small and one large species occur at lower altitudes, and are replaced at higher ones by another pair of small and large congeners. In the case of the two overlapping sibling species of *Neopsittacus*, ecological separation is achieved in part by diet, the Yellow-billed Lorikeet mainly targeting fruit and seeds, the Orange-billed Lorikeet (*Neopsittacus pullicauda*) nectar; and in part by elevation, the former generally occupying lower forest than the latter. In south-east Brazil the two *Touit* species also separate to some extent on altitude, as do the two *Psilopsiagon* in the Andes. Where Red-bellied (*Poicephalus rufiventris*) and Brown Parrots (*Poicephalus meyeri*) overlap, for example in northern Tanzania, the former forages in open savanna, the latter in riverine woodland running through it. With the two *Cyanoramphus* parakeets of the Antipodes Islands, the Antipodes Parakeet subsists chiefly on the leaves of *Poa* and *Carex*, the Red-fronted on their seeds, the former nest-



Lovebirds are distributed throughout Africa south of the Sahara and Madagascar. Although the different species are closely related and hybridize easily in captivity, their ranges are sharply defined, resulting in almost completely allopatric distribution. The Rosy-faced Lovebird is found in dry, rocky terrain, wooded river canyons, scrub-covered hillsides and more open country up to an altitude of 1500 m. Though it lives in an environment characterized by aridity, paradoxically the species is heavily dependent on water, and permanently requires easy access to water-holes.

[*Agapornis roseicollis roseicollis*, Fish River Canyon, Namibia. Photo: Peter Pickford/NHPA]

ing in the bases of tussocks, the latter in the crowns of tussocks or fern clumps. In the case of Eastern (*Platycercus eximius*) and Pale-headed Rosellas (*Platycercus adscitus*), which take similar food types, namely seeds, fruits, flowers and insects, there are differences in the feeding stations, the former foraging mainly on the ground, the latter at low bushes, logs or fences. Some puzzles remain, however: the ecological separation of the two native amazons on each of Dominica and Jamaica is still difficult to explain, as is the degree of niche overlap in the largest species of *Ara* in many parts of their ranges.

General Habits

Paradoxically, for all their enormous popularity, parrots remain among the least known of bird groups in many aspects. In the wild they are defiantly problematic to study: difficult to catch; hard to mark, especially as they often prise rings off their legs or allopreen tags off plumage; impossible to follow, for they often range over huge areas; and wearying to try to watch, sitting as they often do in the crowns of tall trees, hidden amongst the foliage for hours on end. Until the 1980's the main studies of their breeding biology and habits were virtually all based on investigations of captive birds, and the chief revelations in this body of work have been just how intelligent the birds are and how complex their social interrelations can be: in other words, as with wild birds, how difficult it is to come to know them. For these various reasons, it is only the rarest species, where last-ditch efforts to save them have necessitated intensive study, or a very few common, low-nesting, open country species, that have allowed biologists a glimpse of the complex processes that compose their lives.

The strikingly manipulative ability of parrots' feet, bills and tongues, their varied and flexible vocal repertoire and their remarkable cognitive abilities all suggest considerable convergence in physiology and life history with primates. Moreover, in usually laying multiple-egg clutches of relatively small eggs that have prolonged incubation periods, and in having hatchlings that are highly altricial yet long in development, they show a pattern of slow growth coupled with delayed maturity, at least in the larger parrots, and long lifespans, all of which are life history parameters very similar to those seen in primates; in fact, records

of longevity are few, but a female Kaka lived 27 years on Kapiti Island, a cockatoo is known to have survived over 80 years in London Zoo, and an African Grey, totally bald for its last 25 years, was said, with reasonable but not conclusive supporting evidence, to have been around 120 years old when it died! Perhaps most intriguing in this regard is the emerging pattern of social relationships in parrot flocks and groups that reflects equivalent systems of hierarchy based on age, experience and association that are found in primate societies.

In one important regard, however, parrot and primate societies differ strongly, for parrots are monogamous, which obviously reduces the degree of complexity in individual relations within groups. Indeed, for parrots the pair is the primary social unit: in general they bond for life, so even outside the breeding season a parrot operates less as an individual than as a member of a pair. Among monogamous species of bird few other groups rival parrots for the persistence of year-round affiliative interactions between partners, and it is probably the high mutual familiarity and resulting hormonal synchrony that has allowed some species to dispense with courtship displays altogether. Aggressive interactions by individual members of pairs are not biased by sex, and psittacids may be unique among birds in the degree to which males and females have equal roles in intraflock aggression and status maintenance. This circumstance, too, may be correlated with the life history parameters outlined above, since there is an extreme division of parental care in the nesting cycle, which suggests the extreme interdependence of the pair as a functioning reproductive unit.

Thus Spectacled Parrotlets (*Forpus conspicillatus*) live in a complex system of individual relationships. Adults form exclusive pair-bonds, addressing all friendly and sexual behaviour to each other, and co-operating in agonistic situations. Within the groups in which these birds live, many activities are closely synchronized, such as foraging, preening or resting. Similarly, flocks of Orange-fronted Parakeets appear to be composed of one or more families and to have an internal peck-order, but tend to be stable at least over the period of a day and probably much longer, acting largely independently of other flocks. Diurnal behaviour follows a cycle involving flight, feeding, resting and intraflock interactions, followed by another sequence of the same, throughout the day.

In the smaller, more continuously sociable parrots the period of post-fledging dependence is short: newly fledged Spectacled Parrotlets, for example, are quickly disavowed by their parents.



A pair of Scarlet Macaws feeding quietly on a huge side branch high up a giant forest tree festooned with epiphytes, overlooking a broad, muddy watercourse: a fit scenario for this magnificent species.

Scarlet Macaws can be found in quite a number of different types of habitat, from humid rain forest, through dense or even partially cleared deciduous forest, to woodland bordering rivers, or even gallery-forest in open savanna country. All these ecotypes are tolerated by these macaws, provided there are sufficient tall trees to meet their food and nesting requirements. The birds may be encountered close to human settlements in districts where they are left unmolested, in which case they can prove quite tame and approachable.

Normally, the birds will feed quite peacefully in the tree tops, but at the slightest hint of danger they will suddenly take to the air, filling the surrounding forest with their raucous screeches.

[*Ara macao macao*,
Tambopata-Candamo
Reserve, Peru.
Photo: Tui De Roy]



The Blue-fronted Amazon, well known in captivity as a good talker, has an extensive range in inland central South America, where it inhabits mainly cerrado and Chaco scrubland. Available information points to this parrot's reliance on tree holes for nesting, though there are reports that cliff sites are occasionally used. Only recently, the species has also been found in places to resort to termitaria, in which to excavate suitable nesting chambers, when tree and cliff nest-sites are scarce. This Blue-headed Amazon at the entrance of a hole in a terrestrial termite mound may well be one such case.

[*Amazona aestiva*, Brazil.
Photo: Roland Seitre/Bios]

Instead of a close parent-offspring relationship, the fledglings form sibling groups with their nest-mates, and indeed are generally assembled into crèches by their parents, which only interact with them thereafter to feed them at intervals. Thus, over a period of months siblings remain the chief interaction partners for all friendly and playful activities, and support one another in agonistic situations. In the first months of life even courtship feeding and sexual behaviour are addressed predominantly to siblings. Thus a pair-like relationship is established between siblings, anticipating the permanent pair-bond of adults. Single fledglings, by contrast, remain poorly integrated into their group. They develop alternative socialization tactics, by joining a group of unrelated siblings, by attempting to remain with their parents, helping to protect and feed younger pairs of siblings or even unrelated fledglings and parents, and seeking early partnership with unrelated group members. If they are unsuccessful in forming a bond at this stage, it seems that their chances of successful breeding in the future may be reduced, but the mechanisms by which the sibling bond is replaced by a sexual bond are not yet reported.

Young Spectacled Parrotlets in groups show a close interest in unusual activities of other group members: social learning, including sexual interaction techniques, appears to be essential. Sibling groups offer good opportunities for learning, and function as a safe basis for exploring the social environment. Eastern Rosellas show a similar pattern. About four weeks after fledging, owing largely to the antagonism of the female, offspring are found less and less in the presence of the parents, the break occurring in stages so that the youngest stay longest. The juveniles form groups from different nests, accumulating in larger flocks in autumn, then gradually breaking up in winter into smaller groups led by young adults and composed largely of juveniles. In time, the birds in these groups establish bonds and begin to seek to take over nest-holes available within the area used by the core population that is composed of sedentary, hierarchically arranged pairs.

The period of dependency is presumably related to the degree of knowledge needed, and this in part may be related to specialization and size. Highly specialized and entirely generalist feeders presumably learn to feed themselves fairly rapidly, but partially specialized feeders may need to learn their skills over much longer periods, given that some of the food they depend

on may only be available long after they fledge. Large birds need to learn the terrain which is to support them, and discover the methods of coping with the different fruits and seeds on which they are to subsist. They watch their parents and attempt to follow their actions in response to different feeding challenges: parrots develop a steady co-ordination of bill and foot as they establish the optimal means of husking food and obtaining the part they require; most individuals are left-footed. Presumably this learning process continues in the period when the parents, for their own survival, integrate in due course into larger flocks, the function of which is, in part at least, to provide information on what food is available where. In the case of the macaws, the exceptionally slow rates of reproduction and recruitment suggest how protracted and often how unsuccessful the painstaking parent-offspring or tutor-pupil relationship can be.

The importance of learning and contact in the early life of psittacids is poignantly indicated by the discovery of some Vasa Parrots (*Coracopsis vasa*), caught at three months of age and kept crammed in tiny cages with village chickens: six months later, the parrots still showed the mental age of three-month-old birds and had learnt to cluck by day and crow at sunrise. However, as social animals evolved to survive by observation, memory and constant adjustment to circumstance, parrots appear to be geared to the learning process throughout their lives. The most remarkable instance of this is Alex, the African Grey owned and tutored by I. M. Pepperberg, who, through 20 years of close interaction with her pet, has demonstrated how mistaken the belief is that parrots are merely the uncomprehending mimics of human sounds. Alex can discriminate between totally unfamiliar items on the basis of abstract categories. He can count to six and use the concept of "none". His understanding of complex human utterances is evident from his responses. When acquiring a new vocalization, he produces, in private, utterances phonologically related to the novelty, mumbling them for several days or even weeks, akin to the way in which human children show monologue behaviour in the early stages of language acquisition. Indeed, he appears to have the emotional equivalence of a two- to three-year-old child, and spends eight hours a day in human company.

Captive birds deprived of constant stimulation and interaction bed down into stereotyped routines and "parrot-fashion" utterances,



Apparently able to perch with impunity on the prickliest of plants, the Cactus Parakeet is closely associated with the peculiar dry thorn forests of the caatinga, in inland north-east Brazil. It is absent from more humid areas, as well as all coastal regions. Caatinga vegetation consists mainly of low thorny trees and bushes, cacti and other succulents, with flowering plants and grasses composing the ground layer.

[*Aratinga cactorum*, Ceará, north-eastern Brazil. Photo: Luiz Claudio Marigo]

and self-plucking appears to reflect a human-like depression or *ennui*. Zoo curators and aviculturalists have started to realize the enormous importance of "behavioural enrichment" in maintaining the health of parrots, which includes providing mates for solitary birds and a panoply of objects with which the birds can "play".

What they are doing is simply substituting the conditions under which many wild parrots grow up. The importance of play, in particular play-fighting, in the development of social bonding in captive Red-and-green Macaws and Keas has been noted. In the latter species, play can be: solitary, involving movements, such as "hand-stands", somersaults in water, and swimming on one's back, or involving food and objects, for instance birds recorded making snowballs, which they pushed around the cage with their heads; and social, involving fighting, hunting and sexual elements, such as jumping on a partner's back, or dancing. In the wild, Keas are legendary for their inquisitiveness and sense of fun, rolling in snow, wheeling about in strong winds, and keeping campers awake at dawn while enjoying repeated slides down the smooth nylon tents. The adaptive value of play behaviour includes anti-predator skills, and newly fledged Golden-shouldered Parrots (*Psephotus chrysoterygius*) are gathered in small nursery flocks by their parents and mostly sit silently in the foliage, but for about half an hour each day they indulge in wild careering flights in and out of the trees, learning to escape predators.

Play behaviour is clearly essential in providing an individual parrot with an awareness of its own abilities and physical environment, but the social dimension must be no less relevant. Various semi-acrobatic antics and chases witnessed in forest-dwelling species such as Yellow-streaked (*Chalcopsitta scintillata*) and Dusky Lorries (*Pseudeos fuscata*) suggest the transference of play-developed skills to agonistic and epigamic contexts, and the growth in repertoire, or at least in understanding of repertoire, of formal displays. There may, however, be links between the amount of play behaviour in a species, the formal repertoire of displays and the degree of its sociality, with these aspects in turn influenced by foraging behaviour and apparatus: in *Trichoglossus* parakeets, threat repertoires increase in complexity with bill length, indicating that the more heavily equipped species have learnt the high costs of physical combat, but whether there is a connection between display or vocal repertoire and degree of handedness in parrots remains to be determined: some genera such as *Neophema* never use their feet to grasp food.

Potential conflicts are common in the lives of such gregarious animals as parrots, when individual distances reduce dramatically during feeding and roosting. The less sociable lovebirds have rather elaborate threat and appeasement displays, but little

On the whole, parrots are sociable birds, often occurring in flocks and feeding parties, although this gregariousness does vary considerably in degree throughout the family. Many species use communal roosting sites, which can be traditional and remain in use for years. The birds daily commute between the roost and the feeding grounds, often travelling fair distances.

Blue-headed Parrots, common over vast areas of South America, follow this pattern, flocks setting off from regular roost-sites in the early morning to return at nightfall, often in spectacular flights involving large numbers, all screaming wildly.

[*Pionus menstruus*, Tambopata River, Peru. Photo: Art Wolfe]





Most macaws and amazons forage for fruit in the canopy. Scarlet and Blue-and-yellow Macaws are sympatric over much of their ranges, but the exact differences between the niches they occupy have yet to be clarified. While the Mealy Amazon readily associates with other congeners on equal terms, it is unlikely to be a major competitor of the much larger macaws. This amazon receives its common and scientific names because its plumage shows a floury whitish sheen, clearly evident on the birds seen here.

[*Ara macao macao*, *Ara ararauna*, *Amazona farinosa farinosa*, Tambopata-Candamo Reserve, Peru.
Photo: Tui De Roy]

inhibition over fighting. The sociable species have little ritualization but fighting itself has become ritualized as bill-fencing, which greatly limits injury; given the great many more contacts in sociable species, this is clearly valuable. Similarly, in the highly sociable *Trichoglossus* lorikeets, co-operative displays between pairs function as mutually co-ordinated aggressive signals to rivals—a form of duetting—and as pacifying signals directed internally between members of a pair, for example on reunion, and thus in both cases indirectly help maintain the pair-bond while minimizing physical conflict.

The pattern of activity in a parrot day varies somewhat between species, or rather between guilds or tribes of species, depending on their foraging targets and strategies, but in general it is fairly uniform. Birds tend to be awake before dawn, and usually vacate the roost-site before or at sunrise, moving in groups to the feeding grounds some distance away, sometimes in high flight, often moderately low over the canopy, and in some species at canopy height or even rarely below it, as in the case of the rather mysterious Caica Parrot (*Pionopsitta caica*). Feeding occurs in the first few hours of the day, to be followed by a lengthy period of relative inertia and quiet over the hotter period, sometimes with renewed feeding, often in more open country species with movement elsewhere to drink and bathe, and usually with short periods of social interaction within and between pairs or other group members. Preening and allopreening commonly occur in this period. In the hour or two before sunset a second main bout of feeding occurs, the birds subsequently regrouping and returning to the roost-site, arriving either side of sunset, sometimes at staging areas, generally amidst much babble, before settling in and becoming almost entirely silent for the duration of the night.

In the more sociable species, maintenance activities tend to be co-ordinated, having a strong mimetic value to all birds in view. Allopreening, which appears to reinforce the pair-bond, is normally confined to the head, although juveniles in particular will preen other parts as well. Birds bathe, though not with great frequency; lovebirds and some lorikeets descend to water on the ground, but some birds such as Rainbow Lorikeets simply flap about in wet canopy foliage, or hang upside-down in the rain with feathers ruffled. Resting hours may also be passed chewing wood, bark and other objects, to keep the bill in optimal condition. Some subtle anti-parasitic behaviour may also occur at this time, although the

only clear observations have been in captivity: when leafy branches of kanuka (*Kunzia ericoides*) and manuka (*Leptospermum scoparium*), both plants that might control both endo- and ectoparasites, were placed in the cages of some *Cyanoramphus* parakeets, the birds chewed several leaves, took some preen oil and drew individual feathers from base to tip through the mandibles, with numerous switches between preen oil and chewed leaves.

In Grey Parrots the typical roosting site is on *Raphia* palms, or occasionally hanging bamboos, fringing a large river. The flexibility of the palm stems and the border of water are believed to serve to reduce the opportunity for nocturnal predators to attack. The birds also use *Raphia* where it grows in swamps and no rivers are near, but plantations of oil-palm and coconut have also now become popular with the species. In part the choice of palms over hardwood trees appears to be a man-made phenomenon, since tree roosting renders birds vulnerable to a particular trapping method (see Relationship with Man). Each palm leaf only supports one or two birds, and usually each palm only has a few birds, so that a large roost of a thousand parrots can occupy 25 ha. In the morning the birds depart extremely early, the earliest record being 04:25 hours, although the first departures are usually between 04:50 and 05:15, in pitch blackness. Most of the remainder then leave within 45 minutes, in waves, and a roost can be completely vacated by 05:35, when it is still virtually dark. While still perched, the birds mainly whistle; before each departing wave there is a silence, then as they fly up they call raucously, resuming the whistling once they reach cruising speed.

Grey Parrot roosts are highly traditional and if undisturbed by trappers may remain in use for decades. Spacing between these roosts appears to be fairly regular. In Ghana, roost density is around 18–27 per 10,000 km² of forest. In Gabon up to 10,000 birds have been recorded in a single roost, the birds travelling from points within a radius of 20 km of the site. However, attendance at roosts varies with season. Breeding adults spend the night in their nest-cavities, and return to the communal roost with their new families.

Budgerigars roost in trees, often coolibahs (*Eucalyptus microtheca*) and mostly along watercourses, but usually changing the site each night. Daily activity starts just before dawn, birds first preening, calling softly, and taking off in groups, or as one, around sunrise. As sunset approaches, birds move back from open terrain into wooded areas, where they perch and preen on

The daily activities of most parrots, like these Fischer's Lovebirds, seem to follow the same general pattern. Flocks usually spend the early hours of the morning feeding. A long interlude of limited activity follows, through the hottest hours, when birds may intersperse periods of rest with comfort behaviour and social activities including mutual preening and allofeeding. The late afternoon programme includes another round of feeding, perhaps a visit to water to drink, possibly to bathe, until before sunset the birds begin the return journey to the roost-site.

[*Agapornis fischeri*,
Serengeti National Park,
Tanzania.
Photo: Ferrero & Labat/
Auscape]



exposed branches, often in dead trees. As the sun sets and its rays are lost, flocks rise up in spectacular flights, calling loudly and swirling at high speed above the trees, then suddenly taking a direct course for the roost-site. There the birds usually take a short time to settle down, giving their roosting calls, presumably used for spacing, and about 20 minutes after sunset, as the light intensity rapidly drops, the birds become still and silent.

When roosting, a parrot will ruffle its feathers and turn the head over a shoulder with the face and bill buried in feathers of the scapulars and back. The hanging-parrots earn their name by sleeping in this position upside-down, as does the Red-headed Lovebird, amid leaves at the slender ends of twigs. Several other species occasionally also roost or at least rest upside-down, including the Black-winged Lovebird, Austral Parakeet (*Enicognathus ferrugineus*), Green-rumped Parrotlet (*Forpus passerinus*), Barred Parakeet, Blue-headed Parrot (*Pionus menstruus*) and Scaly-headed Parrot (*Pionus maximiliani*), although, in the case of the last two, only in the first six months of life. The idea that this behaviour evolved in response to nocturnal predators is entirely plausible, as the hanging position allows for the fastest getaway. In the daytime, such a posture may possibly have more to do with regurgitation and reprocessing of recently ingested food.

Observations at roosts of White-fronted (*Amazona albifrons*) and Yellow-crowned Amazons (*Amazona ochrocephala*) and Orange-fronted and Orange-chinned Parakeets (*Brotogeris jugularis*) revealed that morning departures were commonly in different directions, suggesting that birds deliberately select new orientations in order to avoid conspecific competition at the nearest foraging site along a particular flight-line, a "foraging dispersion hypothesis" of roosting. There can be little doubt that the very large open-air roosts formed by many psittacids, especially those for which resources are unpredictably patchy, are used primarily as information centres in relation to foraging prospects, although the use of sites along rivers or on riverine islands clearly includes an anti-predator component in the function.

Some birds roost communally in holes, and here possibly anti-predator or thermoregulatory considerations become primary. Both fig-parrots and pygmy-parrots use active arboreal termitaria in which to roost, with up to eight birds together; the fact that the birds tend not to quit the site in the morning until well after sunrise, on wet mornings sometimes as late as 09:00 hours, suggests that

information exchange was not at issue. Rosy-faced and Fischer's Lovebirds commonly roost in weavers' nests; Nyasa Lovebirds have been found at night in tree cavities, once with 25 individuals packed inside. In Brazil, the Golden Parakeet (*Guarouba guarouba*) also roosts communally in tree-holes. In the Andes, the Mountain Parakeet (*Psilopsiagon aurifrons*) has been seen going to roost in roadside culverts, and in captivity an Orange-billed Lorikeet, a bird of high altitudes in New Guinea, always slept inside a hollow made nightly under newspaper lining its cage, whereas its lower-altitude counterpart, the Yellow-billed Lorikeet, simply roosted by clinging to the bars of the cage. Doubtless the high-altitude birds use hollows to conserve heat in the cold of the mountain night. It has been shown that the microclimate of Monk Parakeet stick nests, used in winter as roost-sites, affords the species considerable energetic savings. In some species, established pairs commonly use their nest-cavity as a roost-site between breeding seasons. This happens, for example, in Rüppell's Parrots, while in many species the pair members roost together in the nest-cavity as the breeding season approaches. In these cases, roosting behaviour is connected with nest-site defence and pair-bonding as much as with any other function.

A few species of parrot are nocturnal. These include, chiefly and most famously, the Night Parrot and Kakapo, two of the very rarest in the family. Partly nocturnal behaviour is also, however, reported in *Coracopsis* and *Tanygnathus*, the mystery of Buru's Black-lored Parrot (*Tanygnathus gramineus*) being explained by this trait, and in the Kaka and Bourke's Parrot; contrary to common assumption, however, Ground Parrots are not nocturnal. During the day, the solitary Night Parrot reputedly conceals itself at the base of a bush, pulling down stems all round it: a bird kept overnight in a box made a handful of grass it was given into a burrow in which it could not be seen next morning. Kakapos roost under dense low trees, in rock crevices or amidst the roots of trees.

Clearly the threat of predation is very real to roosting birds, whether from owls, mammals or snakes. However, it is by day that the greater dangers seem to exist. The direct evidence is rather slight, but it is known that Orange-breasted Falcons (*Falco deiroleucus*) feed on amazons, Bat Falcons (*Falco rufigularis*) and Aplomado Falcons (*Falco femoralis*) on parakeets, and Ornate Hawk-eagles (*Spizaetus ornatus*) on Scarlet Macaws; a Lined Forest-falcon (*Micrastur gilvicolis*) has been seen taking the



The importance of play to captive birds is recognized by zoos and aviculturalists, who endeavour to provide stimulation and chase away depressive moods by providing mates and a range of playthings for lonely birds: they are simply trying to simulate conditions which parrots encounter naturally in the wild. It is thought that play can also help in the development of the pair-bond, as possibly illustrated by this scene with a wild pair of Hyacinth Macaws: one bird swings upside-down from a branch using the slightest of toe-holds, under the admiring gaze of its companion.

[*Anodorhynchus hyacinthinus*, Pantanal, Brazil.
Photo: Günter Ziesler/
Bruce Coleman]

young of a nest of Yellow-crowned Amazons. Peregrine Falcons (*Falco peregrinus*) have been recorded killing migratory parrots crossing the Bass Strait from Tasmania, and attacking Red-fronted Macaws (*Ara rubrogenys*) in Bolivia. One such macaw, forced down into a tree, escaped by hanging upside-down from a branch with the Peregrine unable to reach it. A Cobalt-winged Parakeet (*Brotogeris cyanoptera*) has likewise been seen to swing upside-down on a branch at the mere appearance of a hawk; and an Orange-chinned Parakeet, spotting the observer, swung below the branch, resembling a still leaf, keeping its back to but watching the observer until he looked away, when it immediately flew off. The response of *Touit* parrotlets to danger is, by contrast, to perch stock-still; when the first specimens of the Golden-tailed Parrotlet (*Touit surda*) were collected, the birds did not fly at the report of the shotgun and were therefore assumed to be deaf, which is why they were given the name *surda*.

A study involving Red-rumped Parrots (*Psephotus haematonotus*) in Australia concluded that, since birds devoted less time to vigilance and more to foraging as flock size increased, it is risk of predation that is the dominant influence on flocking by parrots. The circumstance in which *Prosopiea* parrots in Tonga, where there are no avian diurnal predators, do not flock, whereas they do in Fiji, where there are three, indicates support for this view. As further evidence, foraging Golden-shouldered and Hooded Parrots (*Psephotus dissimilis*) both seek out areas with nesting Black-faced Wood-swallows (*Artamus cinereus*): the insect-hawking wood-swallows act as sentinels for the parrots, which due to their position in the grass are rendered less able to keep watch for themselves. Similarly, foraging groups of Red-throated Caracaras (*Daptrius americanus*) attract Red-fan Parrots and several species of *Pionus* as frequent followers in search of fruits of small trees in the forest understorey; moreover, two species of *Amazona*, one *Pionopsitta*, one *Touit* and even two *Ara*, namely the Red-and-green and Chestnut-fronted Macaws (*Ara severa*), have been seen following such caracara groups. The current assumption is that the parrots are benefitting from the raptors' vigilance to forage in places they would not normally dare visit, and if this is correct then it shows the real deterrent effect the risk of predation must exert on birds that are otherwise assumed to remain in the canopy because this stratum meets all their needs. The highly unobtrusive behaviour of Brown-necked Parrots when drinking in the dry season (see Food and

Feeding) is further evidence of the effect of predation risk on behaviour. Even Rose-ringed Parakeets prefer to feed on sunflowers that allow them the best field of vision.

In nests, hatchling Budgerigars group together in a mound when external disturbance is heard, whereas older nestlings hide in the extremities of the nest-hole, for example up in the hollow limb as far as possible from the entrance. When a female Ceylon Hanging-parrot (*Loriculus beryllinus*) is disturbed on the nest, she can produce, in some mysterious way, a heavy thumping sound, suggestive of pounding the inside of the hollow with a sledge-hammer and presumably intended to act as a deterrent. The incidence of parrot nest predation is very weakly documented, but goannas (*Varanus*) are major causes of nest failure in Golden-shouldered Parrots, which also suffer from predation both of nests and of nesting adults by Pied (*Cracticus nigrogularis*) and Black-backed Butcherbirds (*Cracticus mentalis*); monitors (*Varanus griseus*) are known to be a common problem for Alexandrine Parakeets (*Psittacula eupatria*); snakes commonly take amazon chicks in Mexico; while for Himalayan species the chief threat is the Yellow-throated Marten (*Martes flavigula*). The Grey Parrot is said to prefer nesting in *Distemonanthus benthamianus* because its bark is so smooth that lizards and monkeys are reputed to be unable to climb it. In Green-rumped Parrotlets it is fairly common for prospecting pairs to kill nestlings of an active pair while they are away foraging for their offspring, but this phenomenon is poorly documented in other psittacids.

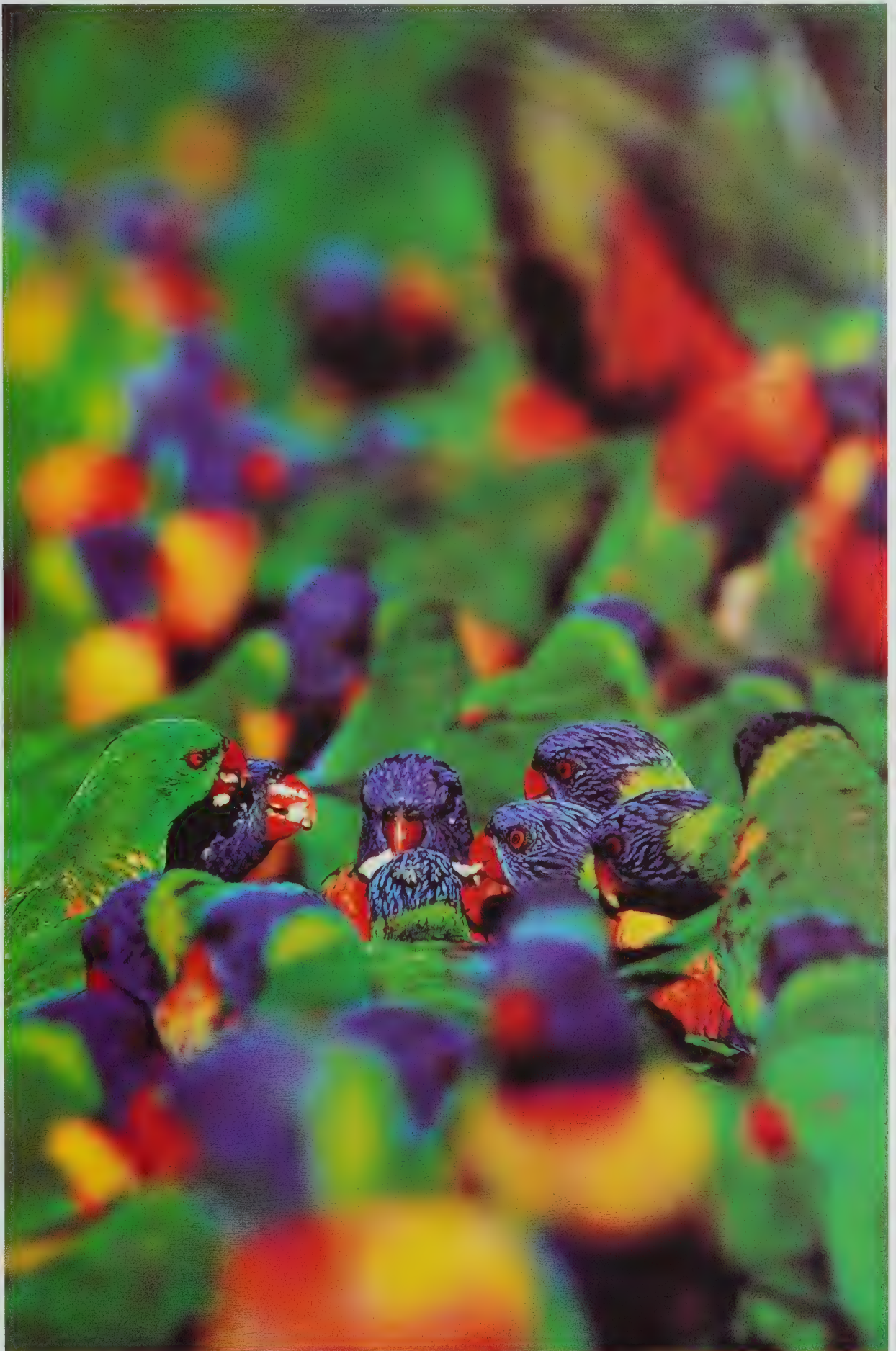
Mobbing appears to be unusual in parrots except in communal-nesting Monk Parakeets, which drive off caracaras, cuckoos and cowbirds from the vicinity of their stick nests, but a flock of Alexandrine Parakeets was once watched circling and harassing a Black Kite (*Milvus migrans*), even forcing it to perch in a tree, then settling beside it and pursuing it again when it took off ten minutes later. A pair of Olive-throated Parakeets (*Aratinga nana*) has been seen mobbing a Grey Hawk (*Buteo nitidus*) in what was thought to be the first case of psittacid mobbing of a known predator. However, when danger directly threatens individuals of the larger parrot species, for example when a pair calls in alarm at an intruder near a nest, or when a bird is wounded from a flock, neighbours gather or the flock regroups to scold around the source of the disturbance, flitting about in a frenzy of agitation and showing, in the eyes of those who have witnessed such

Lories are mostly brilliantly plumaged, almost jewel-like birds, none more so than the appositely named Rainbow Lorikeet.

This species has no fewer than twenty races that are commonly recognized, a fact reflecting its distribution on many islands. It is common in parts of Australia and Indonesia, and is the most numerous parrot in New Guinea. Lories feed primarily on flowers, seeking their nectar and pollen, and as blossom-feeding is a time-consuming habit these birds need to be highly mobile.

The Rainbow Lorikeet's tapering wings and pointed tail permit swift agile flight and pairs or sometimes large flocks, are spectacular in flight as they circle around uttering piercing cries before finally coming down on a blossom-rich tree. Mainly arboreal, they will alight on the ground, frequently attracted by sweet food put out for them. The daily feeding of thousands of these and Scalp-breasted Lorikeets (*Trichoglossus chlorolepidotus*) is now a popular tourist attraction at a bird sanctuary in Queensland.

[*Trichoglossus haematodus moluccanus*, New South Wales, Australia.
Photo: Jean-Paul Ferrero/Auscape]





Parrots are generally monogamous, forming very strong pair-bonds which are maintained beyond the breeding season and may last for life. Partners feed and roost and do most things together, which tends to strengthen the bond, with the result that courtship displays are meagre at best. Courtship-feeding is relatively frequent: this male Red-fronted Parakeet regurgitates food to the female in the same way as she feeds the chicks.

[*Cyanoramphus novaezelandiae*, New Zealand. Photo: Geoff J. H. Moon/FLPA]

things, a remarkably genuine-seeming concern for the bird or birds at the centre of the trouble.

Voice

The sounds emitted by parrots are typically short and unmusical, mainly characterized as shrill, sharp, grating, harsh, and so on; when their calls are more protracted they become jumbled medleys of whistles and squawks with little appeal or structure to the human ear. Except in the fig- and pygmy-parrots, which have calls reflecting their size and subcanopy foraging strategy, these

vocalizations are certainly designed to be heard over considerable distances. Moreover, however unappealing many of them may be, they are, no less than in other birds, species-specific and distinctive. It is intriguing that although both parrots and pigeons commonly travel in flocks between roost-sites and feeding areas and presumably live in fear of the same predators *en route*, pigeons fly silently while parrots announce their journey to the skies with such cacophony; it may be that pigeons, with their lighter bills and food, are sufficiently swift to traverse large airspaces with little risk of attack, whereas parrots, despite their often impressive speed, need to reinforce the cohesion of their more vulnerable flocks with persistent contact calls.



A handsome Purple-bellied Lory perched in the fronds of a palm tree devotes time to the care of its plumage. Preening is a vital activity for birds, and must be carried out regularly to ensure the feathers are in perfect condition, as their very survival can depend on being able to outfly predators. It also helps to reduce the load of ectoparasites, and these can at times be particularly destructive. The cere, a typical feature of psittacids, is particularly evident in this species.

[*Lorius hypoinochrous*, Papua New Guinea. Photo: Daniel Heuclin/Bios]

Parrots commonly spend time on comfort behaviour during the resting hours of the day. Within a pair the commonest activity is *allopreening*, which may help to fortify the bond. It is here being performed by a pair of Red Lories, a species confined to a few islands of the Moluccas. Care is chiefly confined to the neck and head, areas a bird preening itself finds impossible to reach with the bill. The bird undergoing the treatment appears to be wearing a suitably gratified expression!

[*Eos bornea bornea*,
Ambon, Moluccas,
Indonesia.

Photo: Roland Seitre/Bios]



Nevertheless, even macaws, notorious for their raucous, ear-splitting cries which unwary visitors to zoos often have cause to rue, observe strict silence for most of the day. It is only during the hour or so after dawn, or while preening or playing in the safety of tall trees over the midday hours, when flying, and in the hour before dusk, that they vocalize loudly. This is in fact typical of most parrots: a great deal of noise accompanies roost departure and travel to and from the feeding grounds, and individual Red-cheeked Parrots (*Geoffroyus geoffroyi*) even stop off on prominent perches and call loudly to the surrounding area for several minutes in a kind of rallying bugle before resuming their flight; however, once settled, the birds can be so quiet that it is only the sound of dropped food items that gives any indication of their presence. With some very small species, such as the Lilac-tailed Parrotlet (*Touit batavica*), it is often only a diagnostic but little known call in flight high over the forest which reveals their presence in an area, for once they are perched they become virtually impossible to detect: this parrotlet has thus only recently been recorded in French Guiana, yet is probably widespread, even extending into Brazil.

There is good evidence that the complexity of a parrot species's system of vocal communication is related to the degree of its sociability; and as sociability is related to spatial and temporal patchiness of food resources, it ought to be possible to identify those species most likely to possess the largest vocabularies. Some attempt has been made at this in Australia, where an inventory of certain psittacid species ranging from the wettest to the driest habitats showed the following range of vocalizations: Australian King-parrot (*Alisterus scapularis*) 4, Crimson Rosella (*Platycercus elegans*) 21, Eastern Rosella 25, Mallee Ringneck (*Barnardius barnardi*) 16, then the cacatuids Galah (*Eolophus roseicapillus*) 11 and Cockatiel (*Nymphicus hollandicus*) 8, before the psittacid Budgerigar with 8. This array suggests that the social system first becomes more complex as humidity moderates, but then becomes simpler again as humidity continues to attenuate. It may be that environmental conditions which favour either year-round site fidelity or strong nomadism require relatively simple systems of communication, but that those which entail more complicated patterns of site occupancy and desertion require more varied vocabularies related to the hierarchical social structures that result; but this idea has not been examined. Species with wider vocal repertoires seem also to possess wider visual repertoires.

Two species which appear to conform with these principles, although their display repertoires have not been itemized, are the highly unsociable Ground Parrot and Kakapo, both extreme cases by virtue of their highly terrestrial habits. In the Ground Parrot, calling is restricted to before sunrise and after sunset, light intensity apparently governing the timing, and it may be used to advertise, or perhaps achieve, dominance status and individual position in relation to unseen rivals. The density of these parrots influences the rate of calling: the more parrots are present, the more they call. Although the Kakapo produces a variety of squeals and shrieks in territorial confrontations, it is otherwise basically silent apart from those years in which food is sufficiently abundant for it to commence its nocturnal lek behaviour: the male excavates bowl-like depressions or "courts" on a slope within its territory, and uses them to amplify the 25-40 booming sounds it makes in a call series, repeated at half-minute intervals or so, that advertises its presence to prospective mates. As with the Ground Parrot, the amount of booming by neighbouring males seems to stimulate more sound production among them.

All rain forest species might be expected to conform to the pattern of low vocabulary, such as is found in the Australian King-parrot, but this is clearly not so. It may be true in species which, like the king-parrot, are relatively unsociable and territorial, such as the Blue-bellied Parrot (*Tricharia malachitacea*) of south-east Brazil, with its extraordinary melodic calls, given like the Ground Parrot's only in the half-light at dawn and dusk, which appear to be among very few that it is known to utter. However, most rain forest parrots exploit food that is too patchy to permit territorialism, and the meagre evidence is that their vocalizations are accordingly complex. The Red-fan Parrot of Amazonia, for example, is known to have a wide vocabulary, the most distinctive item of which furnishes it with its name ("Hia-hia", "Keeya-keeya") in various Indian languages: soft piping calls, musical whistles, single bugles, various chatterings, a prolonged, soft "yaag" and a high-pitched "slit" have also commonly been heard, several of them in association with courtship and copulation. Most amazons show similar levels of complexity, and Papua's Singing Parrot (*Geoffroyus heteroclitus*) gets its name from the variety of clear, whistling calls it produces.

The African Grey Parrot, like many amazons, possesses a wide vocabulary enhanced by the power of imitation. Recent recording



In general, birds bathe either as a preliminary to preening or a means of cooling themselves. Though parrots are known to bathe, they apparently do so infrequently. Some species indulge in rain or foliage bathing: they flap around in a desultory fashion in wet leaves or hang upside-down on a branch with wings extended and feathers ruffled in the rain. This immature Crimson Rosella, an eastern Australian species, is undertaking a much more thorough and systematic wetting.

[*Platycercus elegans elegans*, Jervis Bay, New South Wales, Australia.
Photo: Jean-Paul Ferrero/Auscape]

has shown that the species copies the calls of various forest-dwelling birds and even a bat, and it is postulated that these imitations are added to the repertoire during courtship. Certainly courtship in many psittacids involves gentle, varied warblings, the most familiar example for most people being the quiet burbling song of the male Budgerigar, punctuated by louder, grating "tuk-tuk" calls as he sits face-to-face with his mate or nudges her. These sounds and associated actions, including courtship feeding, are important in bringing females into breeding condition.

The more sociable parrot species commonly show duetting behaviour within pairs, involving rapid reciprocal exchange of calls. This is a co-operative interaction, but in Canary-winged Parakeets (*Brotogeris versicolurus*), despite study, there is no evidence that it directly promotes pair-bonding. However, in that species it correlates with low-key agonistic behaviour towards conspecifics. Although they join flocks for much of the day, pairs defend favourite day- and night-roosting sites as well as feeding and nesting sites. Duetting signals the close union of a pair, and thus indicates a confidence in resource defence against conspecifics which maintains the joint status of the two birds as a unit within the flock. The rapid development of duetting between partners, with almost no learning period needed, allows just-widowed birds to find a new partner quickly and thus retain control of previously owned resources.

Analysis of the vocalizations of the Monk Parakeet, a bird of semi-arid regions, has yielded a vocabulary of 11 calls that fall into two distinct groups. The first involves aggregating behaviour, and the acoustic characteristics help locate the caller. In this group are the common contact call, used in flight and when foraging and feeding young; an isolation call, which is an abbreviated contact call used by a lone bird to locate others; a preening call, used by members of a pair during allopreening and by parents and offspring in close contact; a chatter call, emitted by adults in the nest or at rest nearby, and regularly given in concert by all birds present at the colony, throughout the year although most often around midday in the non-breeding season; a distress call, consisting of a mournful upward then downward glissando, and exerting a strong attractive influence over colony members, which flock to the source and emit the call themselves; a greeting call, given when returning to the nest and which may serve for individual recognition; a food-begging call, used by nestlings when gaping for food, stimulated by approach and inhibited by retreat; and a feeding call, used by young birds while

being fed and representing a less intense version of food-begging.

The second group of calls involves dispersive behaviour, and the acoustic characteristics do not contribute to location of the caller. In this group are the threat call, used in both intra- and interspecific defence of the nest; the alarm call, uttered in situations of danger and fear such as human approach or the overpass of a Spot-winged Falconet (*Spizapteryx circumcinctus*), and having the effect of causing conspecifics to fly to a high perch or to seek cover, but never in the nest; and the flight call, usually given singly at the start of flight and used by all members of a flock during take-off. This last is connected with departure and dispersal, but nevertheless often has the effect of attracting conspecifics.

Food and Feeding

Parrots chiefly eat seeds, fruit and flower products. The Loriinae, Swift Parrot and Philippine Hanging-parrot mainly consume nectar, and have tongues adapted for the purpose, although many other species target flowers. The Psittacinae are preponderantly seed-eaters, and when various fruits have been reported in their diets it is usually the case that what was actually being consumed was the seeds of the fruit, not the pulp as is so commonly imagined. There are of course exceptions and variations, some of them reflected in feeding apparatus morphology and thus represented by taxonomic delineations.

Access to the high nutritional content of hard seeds and nuts is the prime explanation for the evolution of the powerful counter-curved bills of all parrots. The method the birds employ to obtain that access is consistent throughout the family, with the sole but significant exception of the monotypic Psittichadini. The fruit or seed is placed between the frontal edge of the lower mandible and the distinct step on the horny palate of the upper mandible, whose tip is corrugated on the inside to improve grip. The lower mandible's frontal edge penetrates the husk and sinks between the seed and the outward-facing husk, which is thus removed. The seed is then rotated with the tip of the tongue so that the remaining husk is gripped in the corrugations, and this and any pulp removed. All this happens with great dexterity and speed. The seed is then split and ingested. In the case of a very hard nut, the parrot holds it in the part of the bill nearest the gape, where pressure between the mandibles is greatest. This

Red-and-green and Scarlet Macaws and Blue-headed Parrots are all participants here in a peculiar phenomenon that can be observed in south-eastern Peru, where exposed banks of clay occur in the forest. Flocks of these and many other parrot species throng to the clay-licks, using their bills to scrape off fine particles which are then swallowed. So far, no entirely convincing scientific explanation of this behaviour has been forthcoming. It is thought that the parrots eat seeds or unripe fruits containing toxic alkaloid substances, the effects of which the clay particles may help to palliate. Some alkaloids are stimulants and intrigued researchers have noticed that macaws frequently arrive in a very excited state at the licks, but that after a dosage of clay they appear considerably calmer! So many birds frequent these licks on a regular, sometimes daily, basis, that one assumes the practice is of paramount importance, especially as there are inherent dangers involved. On the very exposed clay banks, the brightly coloured parrots often fall victim to marauding raptors. Nevertheless in other parts of their ranges this strange behaviour is not observed in the same species.

[Above: *Ara chloroptera*,
Ara macao,
Manu National Park, Peru.
Photo: Günter Ziesler.

Below: *Pionus menstruus*
menstruus,
Tambopata River, Peru.
Photo: Art Wolfe]





The Mountain Parakeet, a species of rather arid habitats up to 4000 m in the Andes, can find it hard to satisfy its needs for water in certain areas. There is a report of some birds drinking from melting icicles beside a frozen stream in Bolivia, a picture which hardly fits the popular concept of parrots as birds of the sweltering tropics! These birds have managed to locate water and now drink thirstily, but warily. A bird is at its most vulnerable when drinking with its head down. Flocks of most species will approach water very cautiously, with only a few at a time venturing to drink.

[*Psilopsiagon aurifrons rubrirostris*, c. 3000 m, northern central Chile. Photo: Günter Ziesler]

process is repeated a number of times, with the tongue rolling the nut around until eventually it opens. The shells are then dropped and the kernel swallowed.

The zygodactyl feet of parrots are often important in assisting the husking process. In hanging-parrots, for example, the bird detaches an item and, perching on one foot, transfers it to the other foot, usually the left, which is held up to the bill for ease of access; often the bill is lowered and the foot raised to meet each other half-way. Less often the foot remains on the perch with the food in it, or fixes the food between itself and the perch, and the bird eats it there. Apart from this, the feet enable parrots to hang upside down to reach otherwise inaccessible fruit or flowers.

Parrots, then, are primarily seed-predators. Macaws consume the seeds of many different fruits, in most cases rejecting the surrounding pulp, but sometimes eating it as well and more rarely eating it in place of the seed, as in the case of *Borismene japurensis*. They also consume flower nectar, leaf petioles, and mature leaves, for example of the palm *Iriarteia ventricosa*. A good proportion of their food is made up of dry seeds normally dispersed by wind or water, such as the winged seeds of the mahogany (*Cedrela odorata*) and the floodplain tree (*Terminalia oblonga*); they may be the only vertebrate predators of the explosively dehiscent fruit of the soapbox (*Hura crepitans*). The chief feature of their diet, however, is its sheer variety, shifting through the spectrum from small soft figs to large hard palm nuts.

A remarkable piece of observational deduction by Hyacinth Macaws has recently been discovered. This species eats palm nut kernels, and birds have to remove the "ectocarp" and outer fibrous cover, which requires time and subsequent bill cleaning. Some birds have evidently learnt that agoutis (*Dasyprocta*) and possibly other rodents readily eat these outer layers from fallen nuts, but cannot manage the kernels: the macaws have thus been seen to cut and drop many nuts to the ground, then fly down to where de-husked kernels from the previous night are lying and eat them, leaving the just-dropped nuts for the coming night.

Macaws tend to eat the seeds of slightly unripe fruits. In doing so they establish a competitive edge over animals for which the tree "intends" the fruit as an inducement for the dispersal of its seeds. Eating or merely cutting through unripe, tannin-rich pulp, and consuming seeds which are often protected by distasteful or even toxic secondary compounds, is thought to be the

reason macaws and indeed other parrots, not just in South America, visit clay banks and salt areas, since the clay may help absorb or filter toxic compounds of rain forest fruits.

The seed-predation story is repeated everywhere. Red-lored Amazons (*Amazona autumnalis*) have been identified as a major seed-predator of the prominent forest tree *Stemmadenia donnell-smithii*. In one study, the least fecund trees lost their entire crop to these birds, while the most fecund lost 33% of their crop. The Orange-chinned Parakeet is a seed-predator of figs, testing each seed for intact condition before processing it via the bill to the gizzard; a specimen collected from a flock of about 100 birds contained 4815 such seeds after a morning's feeding, which, with various allowances, was calculated to have involved the bird in picking 510 figs. In other words the flock of 100 parakeets would have picked 51,000 figs in a morning, some 15% of the entire crop in the tree at that time. Observations on Grey Parrots at a *Pseudospondias microcarpa* tree revealed that they consumed 5.2 seeds per minute so that, with an average stay of 48.9 minutes and an average flock size of 3.9 birds, the total consumption of fruit in that particular tree was 992 per morning. Fig-parrots are seed predators of various fruits, breaking into pods and also soft-bodied fruit and pulling away the flesh and other matter to obtain the hard seeds at the centre.

Parrots appear hardly ever to act as dispersers rather than predators of seeds. *Brotogeris* parakeets have been found to disperse the tiny seeds of *Muntingia calabura*. Blue-headed Parrots are probably the primary instrumental disperser of *Albizia* fruits, since they often drop the pods on the ground with some seeds still in them, making them available to secondary dispersers. Nevertheless, this is a parrot which specializes on plant species that produce many fruits in a short fruiting period, such as *Inga* and *Ficus*, probably also *Albizia*, and the intensity of its seed predation of *Albizia* was estimated at 8% of the fruit crop, which is similar to an estimated 6% for *Amazona* parrots on *Tetragastris* and other psittacids on *Sterculia*. Little further evidence of seed dispersal by parrots exists; saplings at the feet of baobabs used by roosting or resting Brown-headed Parrots (*Poicephalus cryptoxanthus*) were of plants not associated with the mopane woodland in which the baobabs stood and, all being of trees whose fruit were suitable for birds, were judged possibly to have sprouted there from seeds voided by the parrots.

Many parrot species, especially in Australia, are chiefly granivorous. Budgerigars feed on the ground, taking fallen seeds

from the earth surface or climbing up and down tussocks of grass to get at the still-attached seed-heads, running them through the mandibles to harvest the seeds. Hooded Parrots do likewise but seeking first the company of Black-faced Wood-swallows (see General Habits), whose use as sentinels probably increases foraging time and feeding efficiency. Given the fact that there appears to be high mortality among young birds owing to the difficulty of learning to husk certain grasses when others become unavailable, it seems that even small amounts of extra foraging time may be vital for the survival of birds.

Although it, too, feeds on the ground, the Kakapo is only partly granivorous, having adapted to nutritionally poorer food resources to survive in leaner times. To obtain its requirements it thoroughly grinds food items within the broad lingual bill surfaces, ingesting only the juices and finely processed particles, expelling the residual fibrous material in pellets. Anatomical studies show that the tongue and palate of the Kakapo are also particularly well adapted for the grinding of fibrous plant tissues to extract soft portions and juices. The species leaves characteristic signs of its presence: leaves, buds or stems are chewed for their juices without being snapped off, so that balls of macerated fibre are left hanging on the plant where they bleach in sunlight. Rather similarly, the Antipodes Parakeet consumes grass leaves by biting off lengths of up to 20 cm, holding them in the foot, and chewing them progressively towards the tip, with up to 15 lengths a minute being achieved. Piles of crushed chewings with an unchewed tip are distinctive signs of feeding.

Pygmy-parrots glean principally for lichen along the trunks and branches of trees, either downwards in nuthatch fashion or upright, using the tail as a prop. They move industriously along angled surfaces, rarely vertical ones, shuffling along the tops of limbs and frequently bobbing the head around the side of a branch, picking up small objects from the bark surface or flaking off pieces of bark and consuming the items thus exposed. Individuals keep close together and work over an area thoroughly before moving on. They often leap surprising distances when shifting from one branch or trunk to another. It has been suggested that

these birds may be nomadic, which raises the question of what seasonality might exist in the food resource they exploit.

Pesquet's Parrot is unique among psittacines not only in rejecting seeds from its diet but also in its feeding method. When it feeds on fruit, it bites off a fairly large piece which it takes onto the tip of the tongue, and then in opening and closing the jaw several times, but not chewing the morsel, the tongue slides back and forth in synchrony, hooking bits of the morsel and drawing them back to the mouth cavity and into the pharynx. The fruit is thus not processed by the bill in any way before ingestion.

Members of the Loriinae, the Swift Parrot and the Philippine Hanging-parrot all target nectar and pollen as their chief source of nutrition, gathering it from flowers with their long, narrow, brush-tipped tongues. As a consequence their gizzards are much less muscular and their intestines shorter than other parrots of equivalent size, although it is in the intestinal tract that most pollen is digested. Nectar is held in the crop, which enlarges to accommodate it; when birds digest nectar, they accumulate subcutaneous fat. Studies of the Purple-crowned Lorikeet (*Glossopsitta porphyrocephala*) have shown that the tongue can be used to harvest pollen, compressing it into a form suitable for swallowing, but that this is not necessarily its chief function. The species can also take sufficient nectar for its daily energetic needs in 2-3 hours, the same foraging time needed by the Rainbow Lorikeet, which means visiting about 5000 *Eucalyptus* flowers, and birds have been timed tapping 35 flowers a minute; it seems that both food items are important for lorries, pollen supplying nitrogen and nectar carbohydrate.

Nectar-feeding demands wide-ranging behaviour, since flowering events vary in time and space, and the birds have constantly to be on the move in search of new sources. Presumably "trap-lining" strategies are used, in which birds visit known flowering trees on a long-distance daily circuit, which at the same time involves testing and checking other trees about to bloom; but as yet all the evidence is qualitative. There must, however, be interesting and complex trade-offs between energy acquisition (quality and quantity of food when found) and energy expenditure (effort spent

Parrots need access to drinking water on average once a day. It seems unlikely that the large macaws, such as these Red-and-green and Scarlet Macaws, experience serious problems in finding water to drink. In the first place their diet is rich in juicy fruits, thereby obviating the need to drink with the same frequency as other members of the Psittacidae, those, for example, that are mainly seed-eaters. Second, as inhabitants of damp lowland evergreen forests, they do not have to travel far to find streams, rivers, lakes or just forest pools in which to slake their thirst.

[*Ara chloroptera*, Ara macao, Peru.

Photo: Jim Clare/
BBC Natural History Unit]





Several Blue-crowned Parakeets are here observed feasting in a China tree (*Melia azedarach*), a plant introduced from Asia. They afford a clear example of the way in which parrots will sometimes use their feet to assist dexterously in the business of feeding. Some parrots secure their food item to a branch and then lower the bill to cope with it. Here some individuals have detached berries and transferred them to the left foot, which they then raise to the bill in a very human-like manner, thus greatly facilitating the actual consumption of the food.

[*Aratinga acuticaudata neumanni*, Tambo, western Santa Cruz, Bolivia. Photo: Luiz Claudio Marigo]

finding it). In the Henderson Lorikeet (*Vini stephensi*) of remote Henderson Island, the species appears most heavily to exploit two particular sources of nectar: one (*Scaevola*) is much richer than the other (*Timonius*), but is less predictable and rarer, so that the net energy gained by feeding on the two plants may be similar, given the greater energy needing to be expended in searching for and travelling between the patchier *Scaevola* flowers.

Although the Philippine Hanging-parrot has the most specialized tongue for nectarivory in its genus, other *Loriculus* species also take nectar, and in doing so do not destroy the floral parts of non-tubular blossoms to reach it, unlike *Psittacula* parakeets, and by transporting pollen adhering to their head feathers they may play an important role in cross-fertilization, as lorries must do. Also like lorries, hanging-parrots are greatly attracted to pots collecting coconut palm toddy, and birds commonly consume such quantities that they become temporarily stupefied and are easily caught! In the Neotropics the *Brotogeris* parakeets are probably the most nectarivorous genus, having the same narrow, prominent bills that characterize the Loriinae and *Loriculus*.

Two further liquid food sources are sap and honeydew, both exploited by New Zealand's energetically constrained Kaka. Birds sap-feed using two distinct methods. In one, they strip bark from a branch or trunk, exposing the cambium, and then lick sap exudate from the damaged surface. In the other they tap and feed on sap from "trapdoors" in the trunks of *Metrosideros* trees: this is done by peeling loose bark, then using the lower mandible to prize a trapdoor through the remaining bark, gouging a series of tiny holes into the superficial layer of yellow cambium, and licking the sap that leaks through the perforations. Honeydew from the scale insect *Ultracoelostoma assimile* in *Nothofagus* forest builds reserves in summer and autumn that are critical to the birds' breeding performance the following spring, and competition for this source from introduced wasps is contributing to a serious drop in output.

Apart from honeydew, there are relatively few instances of animal food playing an important role in parrot diets. The Kaka also consumes larvae of the longhorn beetle *Ochrocydus huttoni*, which are protein-rich but energetically expensive to obtain. Its close relative the Kea scavenges the corpses of sheep, and the Antipodes Parakeet occasionally feeds on dead penguins and pet-

rels. In Australia there is widespread opportunistic use of psyllid lerps, which infest eucalypts and casuarinas, and the larvae of beetles and moths are frequently cited as minor supplements to diets. The use of arboreal termitaria as nest-sites in both the New and Old World, and terrestrial termitaria in the Old, has been a common cause of speculation as to whether termites themselves are taken as food; there is still no good evidence that they are.

Amongst the most interesting observations of "carnivory", still apparently unique, are those of P. Roth in central Brazil concerning the secondary use of specialized bills on molluscs. He saw Golden-winged Parakeets (*Brotogeris chrysopterus*) foraging in the dry season on water snails. They fished the snails out of the water, carried them to a nearby bush perch and, holding the shell in one foot, extracted the animal with the long, thin tip of their upper mandible. Elsewhere he saw Hyacinth Macaws do exactly the same thing with *Pomacea* apple snails, the food for which the bill of the Snail Kite (*Rostrhamus sociabilis*) is particularly adapted. Clearly the bills of these two parrots can occasionally serve quite separate purposes when opportunities arise. Conversely, of course, the highly specialized bills of the Slender-billed Parakeet and Red-capped Parrot do not debar them from foraging alongside normal-billed parrots.

Psittacids drink with various sucking and pumping actions of the tongue, depending on its morphology in relation to different feeding methods; in other words, these different drinking methods are a by-product of the adaptive radiation in psittacid feeding techniques. In lovebirds, drinking is accomplished by dipping the scoop-like mandible in water and then ingesting by means of rapid, piston-like movements of the tongue; the head may or may not be tilted up.

Rainbow Lorikeets drink water caught by leaves or interlaced fronds of plants, or reach surface water from floating logs, although in general nectar-feeders appear to have little need to drink; this may explain the ability of the Princess Parrot (*Polytelis alexandrae*) to go without water in the interior desert of Australia. However, granivorous Bluebonnets (*Northiella haematogaster*) are capable of surviving well without access to water, at least the race *narethae*, since the country they occupy had no water before European settlement: birds have been found more than 50 km from water even



The five Vini lorikeets inhabit Polynesian islands where, without exception, they are rare and declining in numbers, victims of habitat destruction.

The very striking Blue Loriekeet, with a very restricted range, frequents wooded areas of both native and introduced trees, showing a possibly seasonal preference for banana and coconut plantations. It feeds on the flowers and products of hibiscus, mango, banana trees and coconut palms. One perched typically in a banana tree is seen searching the flowers for nectar and pollen.

[*Vini peruviana*,
Tuamotu Archipelago,
South Pacific.
Photo: Roland Seitre/Bios]

during periods of drought. Scarlet-chested Parrots (*Neophema splendida*) are likewise claimed to be able to obtain moisture by drinking dew or chewing water-bearing plants such as *Calandrinia*. Smaller granivorous parrots demonstrate much greater capacities for water regulation efficiency than do larger ones, being dependent on small carbohydrate-rich seeds which yield their water during metabolic processes. It is therefore no surprise that the most successful parrot of the arid interior of Australia is the Budgerigar, in which the necessity of drinking appears related to temperature: evaporative water loss in the species is 16 times higher at 45°C than at 25°C.

When drinking, Budgerigars first gather in a group of trees near the water's edge, then fly down to join numbers on ground; birds at the edge itself drink for a few seconds before taking flight and being replaced from behind by other birds. In one instance where floodwater reached lower branches, birds climbed down in single file to drink in turn. Occasionally when no secure shoreline exists birds will water on the wing, landing momentarily on the surface, drink, and take off. Birds sometimes drown when drinking in very large flocks when other birds alight on top of them.

With the arrival of dry winter in June and July, water resources become scarce and birds are then forced to visit a few key places in order to drink and bathe, where the risk of predation by raptors must be greatly enhanced. During the equivalent dry periods, Amazonian species such as the Blue-headed Parrot, which otherwise can supply their needs for water from holes in trees and so on, come to drink at river margins, arriving in large flocks which presumably offer greater individual protection to their members. In Africa at such times Brown-necked Parrots drink in a very unobtrusive fashion, in contrast to their normal raucous behaviour. In one case birds were seen flying in complete silence from perches in scrub to a stream-fed pool well shielded by vegetation. Drinking by individual birds was done for a few minutes once every one or two days, showing the importance of water to the birds. In Australia, Bourke's Parrot has the strange habit of coming in to drink well before dawn and well after sunset, sometimes as late as 21:00 hours, which is presumably why the species is sometimes called "Night Parrot". This behaviour may also be a predator-avoidance stratagem, al-

though since no other Australian parrot goes to such extremes it is hard to see why.

The stomachs of many Australian parrot species have been found on examination to contain charcoal. This is possibly related to the mitigation of toxic substances in their diet, as clay and salt appear to be in Neotropical and African species. Grit has also been found in the stomachs of some birds, doubtless as with many bird species as an aid to processing hard seeds.

When breeding, parrots inevitably forage close to their nests. Superb Parrots (*Polytelis swainsonii*) forage up to 10 km from the nest-hollow, usually following woodland corridors rather than making direct flights over open ground to reach their preferred food sources. By contrast the large, usually wide-ranging macaws generally confine their foraging to within 2 km of the nest. They clearly know which trees are producing fruit, and move relatively short distances between them. Their involvement in breeding can often be deduced from the greatly distended crops in which they carry food to their nestlings. Young birds of all species are fed with food regurgitated from the crop, but there seem to be few data on food selection in relation to nestlings. Blossoms of *Combretum farinosum* seen being taken extensively by adult Orange-fronted Parakeets in the breeding season may well have been an important component of food fed to nestlings.

Breeding

Three key features of parrot breeding biology are that they usually pair for life, almost invariably nest in holes, and show no strong territorialism beyond the immediate vicinity of the nest so that, in some cases at least, conspecifics can be quite strongly colonial, with several pairs occupying a single tree or cliff-face. Apart from the Kea, which is polygamous and observes a strict pecking order allowing one male to be attached to up to four females, and the Kakapo, which leks and forms no bond whatsoever, all parrot species establish monogamous pair-bonds. In many, these are maintained throughout not just the annual but also the life cycle. However, between-year changes of partner occur regularly in the Green-rumped Parrotlet, and this may be a

more widespread phenomenon than current documentation shows.

Different parrot species have different displays that help establish the pair-bond, detailed through various (mainly captive) studies, but the example of the Rose-ringed Parakeet is broadly typical. In courting, the male parakeet performs a "Parade" or "Stately-walk", with slow deliberate steps; gives an "Eye-blaze", a common psittacid display in which the pupil constricts to reveal the outer edge of the iris; and often makes a series of bows. The female, who becomes dominant as the bond develops, in due course responds with slightly spread wings, swaying head, rolling eyes and a courtship call. Allopreening by the male may initially be tentative and hasty, followed by a "Guardman posture" in which he cranes his head high and raises the foot nearer the female as if in self-defence. With greater confidence, closer allopreening and billing occur, followed by courtship feeding. In due course this leads to copulation, in which the male often makes many attempts to mount, sometimes fluttering from one side of the female to the other, as hanging-parrots do. He allopreens the female's nape, she crouches lower, and he places one and then both feet on her back, droops his wings, eye-blazes, and begins a ritualized hammering with his culmen on her nape, this lasting up to four minutes in new pairs, before cloacal contact is made.

In the courtship approach several variations occur in other parrots, involving head-bobbing, head-stretching, tail-fanning, and, in fig-parrots, short fluttering flights away from the female followed by renewed approach on foot; but bill contact with a food-pass seems to be widespread. For *Forpus* and *Loriculus*, prominent display of the respectively blue and red rump is standard. In copulation in New World parrots it is usual for the male not to step onto the female's back, but to grip the perch with his outer foot, place his inner on her back, and swing his cloaca laterally against hers. Perhaps the most extreme aberration is the remarkably protracted copulation shown (in captivity at least) by Vasa Parrots, where the

cloacal mass of the male enters that of the female and the two are locked together for as many as 100 minutes.

Sexual interactions mostly occur at or near nest entrances or in trees nearby, although in one interesting case several pairs of loosely colonial Orange-bellied Parrots (*Neophema chrysogaster*) were found to use a single "communal" acacia roughly in the middle of their nesting area for the performance of their courtship behaviour, while in Eclectus Parrots copulation may take place inside the cavity, where the female spends an inordinate amount of her time prior to the start of breeding. In general, it appears that the longer the bond is sustained, the less the displays are needed. In some highly gregarious species the courtship repertoire is greatly curtailed: Canary-winged Parakeets have none; copulation in Rainbow Lorikeets is performed without ceremony; and rosellas show little courtship feeding and apparently no courtship preening. Nevertheless, for many parrots allopreening is probably the key behavioural mechanism for year-round pair-bond maintenance, although the same function is fulfilled by year-round allofeeding (courtship feeding without further motivation), at least in many Neotropical genera.

Possession of the nest-hole is a vital first step in the breeding cycle, and one of the most frequent causes of fighting between conspecifics. The nest-hole is the focus of an extraordinary amount of attention by a pair long before egg-laying begins. For example, nest defence in a feral population of Red-crowned Amazons (*Amazona viridigenalis*) in Los Angeles begins in September, even though egg-laying only commences around March; it builds in intensity in the months preceding laying, but as soon as the clutch is started it may cease and a second pair can then take up residence nearby. Similarly, Red-and-green Macaws have been seen disputing ownership of cliff nests in June and July, although breeding was not due to start until October; of four successful hole occupants, one particular pair not only defended their own site but those of the three others in their absence. In



The basic structure of the bill is common to all parrots: a decurved upper mandible fits closely over the recurved lower one. Articulation with the skull allows both mandibles extensive movement and leverage, enabling a parrot to crack hard nuts and seeds. The mobile muscular tongue plays a role in helping the parrot to manipulate and control the food in its bill. The White-fronted Amazon has a heavy bill; the notch in the upper mandible is plainly visible in this bird, and the part played by the tongue is also evident. Favourite food items of this species are figs and the unripe fruit of tree cacti; as it gorges on them the head and breast feathers may become heavily matted with the juice.

[*Amazona albifrons nana*, Belize.

Photo: Jim Clare/
Partridge Films/
Oxford Scientific Films]

The Double-eyed Fig-parrot is a tiny species with a rather large head, and a robust bill as broad as it is long. The belief that it is rare may stem from its small size, which makes it difficult to see as it creeps about quietly in a mouse-like fashion when feeding. Only occasional calls and faint sounds of falling pieces of fruit draw attention to its presence.

As the name well indicates, the fruits of various *Ficus* trees make up most of its diet, and birds have been seen to consume mostly the seeds, rejecting the flesh. Among other food items taken are different fruits and berries, nectar, and even insects and their larvae.

[*Cyclopsitta diophthalma*.
Photo: Hans & Judy
Beste/Ardea]



many cases, adult birds remain close to the general area throughout the year, ready to stake or re-stake their claim to a hole.

Co-operative breeding is a phenomenon often related to scarcity of nest-sites, and given that nest-sites appear to set limits on populations and ranges of parrots, it might be expected that co-operative breeding would be widespread among the family. In fact it is very poorly documented, and seemingly rare. The only good evidence appears to be for the Golden Parakeet of Amazonia, although help with nest excavation has been attributed to the probably closely related Yellow-eared Parrot. In the case of the Green-rumped Parrotlet, the response to low nest-site availability is not co-operative breeding but, apparently, an increase in clutch size (the "limited breeding-opportunities hypothesis"), enabling pairs to rear more young than tropical birds would normally endeavour to do in one cycle.

The nest itself may be prepared by the birds over several weeks if, for example, the entrance needs widening or the floor levelling. Both sexes may participate in this work, and at least in *Aratinga* parakeets the male takes the initiative in digging, with the female becoming increasingly involved and entirely taking over the final stages. In some species where a natural cavity already exists the female does the work alone, sometimes kicking out detritus in the bottom of the cavity while the male perches nearby. Since darkness is known to stimulate egg-laying in Budgerigars, a connection doubtless exists between female nest-site preparation and the assumption of breeding condition. Presumably in the many cases where the nest-site is retained from year to year, which seems to be the norm at least when breeding is successful, the time spent in its preparation may greatly diminish or become ritual in nature. However, in at least one species, the Red-cheeked Parrot, the nest-site is apparently changed each year.

This is presumably also true of the Ground Parrot, which cuts thin stems of sedges, rushes and small herbs to form the nest-cavity at the centre of a clump, hollows a scrape in the sand, lines it with cut herbage, and provides it with one or two access tunnels through the vegetation. Female Kakapos use crevices and tree-roots to part-shield their wood-lined scrapes. Female lovebirds of the "white-eye" group and hanging-parrots construct tight-woven roofed nests inside the nest-cavity, cutting grass material with the bill (only this method is used in the "white-eye" lovebirds) and often tucking it into their plumage to carry it

back to the nest; the rump feathers are used for this by Rosy-faced Lovebirds and Ceylon Hanging-parrots. Similar behaviour has been noted in the Turquoise (*Neophema pulchella*) and Scarlet-chested Parrots of Australia, although their nests, as in most parrots, have only very little lining added, if any. Some lovebirds build their nests into large pendant weavers' nests, while Red-headed and Black-winged Lovebirds are known to excavate their nests in arboreal termitaria, with a tortuous passage from entrance to egg chamber.

Lowland species of pygmy-parrots also excavate nest-holes in arboreal termitaria, but the single upland form, the Red-breasted, has only been found to use dead wood. Either way, from the entrance hole a tunnel only 3 cm in diameter leads inward and upward to enter a chamber directly above the entrance, only some 10 cm high and 6 cm wide, with a layer of detritus. Nests of pygmy-parrots are easily distinguished from those of kingfishers, which also hollow out termitaria, by the ledge the birds construct on either side of the entrance hole.

Some birds use very deep hollows in trees. King-parrots in particular appear habitually to select old trunks that are hollow their full length, and to nest at ground level. Nests of the Bluebonnet may also go down inside hollow trunks even to below ground level, in part simply because most nest trees in the west of its range are so stunted. Similarly, in the Andamans nests of Vernal Hanging-parrots (*Loriculus vernalis*) have been found at the bottom of stumps with the eggs actually below the level of the ground outside. For the most part, however, nests are 0.5–2 m deep, depending on the size of the parrot, and are commonly high in the main trunks or primary branches of large living or dead trees, although some Australian species will make use of fallen logs. In the Neotropics palm stubs are a common location, while some more adaptable species nest in holes in buildings, old piping and fence posts.

The use of holes in cliffs is much more prevalent in the New World than the Old. Some species, such as the Hyacinth and Red-and-green Macaws, will use trees and cliffs depending on availability, whereas others appear to be obligate cliff-nesters, among them the Burrowing Parakeet. Colonies of these birds involve zigzag-shaped nest-burrows that often interconnect, forming small labyrinths. These are often also used as roost-sites, so are presumably maintained and perhaps extended throughout the year, or much of it. Complexity in tunnel construction is shown by other cliff-



nesters as well: two nests of Mountain Parakeets had two entrances, the tunnels joining about 20 cm inside the bank; some cliff nests of Red-and-green Macaws, typically as much as 2 m deep, have branching tunnels that appear to serve as guards against predators or rainfall.

The most anomalous nesting habit in parrots is perhaps that of the Monk Parakeet, the only psittacid species other than the three ground-nesting parrots of Australia and New Zealand (*Pezoporus*, *Geopsittaca* and *Strigops*) not to excavate a nest-hole or use a pre-existing one. Instead it builds a large enclosed nest out of interwoven twigs and sticks. This is used throughout the year for roosting, so when the young fledge they continue to roost in the parental nest during autumn and winter, only leaving permanently before the following breeding season. Although the basic reproductive unit is the pair, in compound nests non-breeding pairs and yearlings contribute to the upkeep of the structure through building and maintenance activities. Such activities have peaks with the onset of the breeding season in October-November, and again in autumn in March-April. Compound nests inevitably evolve from solitary ones and, although there can be strong aggressive challenges from the original occupants, eventually such nests may reach very large dimensions if adequate support is available. However, in old large nests parasites become very abundant, particularly the cimicid bug *Psitticimex uritui*, and the green vegetable material Monk Parakeets add as lining may help control these animals. Low nest-site fidelity, with as many as 47% of the population changing nests between years, may be related to parasitic infestation.

In all parts of the world where they now occur, the stick nests of Monk Parakeets attract many other species for nesting, including Spot-winged Falconets, American Kestrels (*Falco sparverius*), Great Horned Owls (*Bubo virginianus*), Speckled Teals (*Anas flavirostris*), whistling-ducks (*Dendrocygna*), and an arboreal possum. Only the falconets appear to have a major effect, sometimes causing the parakeets to desert. Conversely, Monk Parakeets appear sometimes to take advantage of existing accumulations of nest material, for example building downward below the nests of Jabirus (*Jabiru mycteria*) or onto the remarkable structures of the Firewood-gatherer (*Anumbius anumbi*). Given that the Monk Parakeet's range is almost entirely coincident with that of the Firewood-gatherer, other than the latter's extension into south-east Brazil, and that some lovebirds build in old nests of weavers, it is conceivable that the stick-nesting habit of the Monk Parakeet came about through some utilization, perhaps originally for roosting, of the furnariid's nests.

In this regard it is worth recording the remarkable case of an evidently desperate Green Rosella (*Platycercus caledonicus*) that

The Chattering Lory's diet is known to include nectar from flowering trees, including coconut palms, while, like other members of the genus Lorius, it also feeds on pollen, fruits and flowers. It is an inhabitant of lowland and hill forest, and secondary woodland near cultivation, and it often favours coconut plantations. Restricted to a few of the northern Moluccas, it was formerly common, but because of its popularity as a pet, it suffers from severe trapping pressure and is now classed as Vulnerable.

[*Lorius garrulus flavopalliatius*, central Moluccas. Photo: Rod Williams/Bruce Coleman]



The hanging-parrots owe their name not to their antics when foraging, but to the strange habit of roosting upside-down, whence the alternative name of "bat-parrots". Most species take nectar and may be instrumental in cross-fertilizing plants by transporting pollen in their head feathers. The diet of the Blue-topped Hanging-parrot is not well documented, but it is known to eat the fruits of various Ficus species and, as here, the blossoms of Erythrina trees. Like lorries, many hanging-parrots are addicted to palm toddy, which they drink from collecting pots, at times becoming quite intoxicated.

[*Loriculus galgulus*, Malaysia. Photo: Chew Yen Fook]

Most *Psittacula* parakeets have extensive ranges, but one, the Rose-ringed Parakeet, has probably the widest distribution of any parrot. It is found in a continuous band, not only across the Sahel zone of Africa, but also through vast tracts of Pakistan and India as far as Myanmar and south-east China.

In addition, it has managed to establish feral populations in many cities of the world, most notably those not too far from its natural range. It is naturally found in a variety of habitats, from deciduous woodland, through savanna, open scrubland and semi-desert to evergreen forest. Having learnt to exploit the abundant food supplies offered by man and his multifarious agricultural activities, it also frequents gardens, orchards, all kinds of fields with scattered trees, and even grainyards at railway stations, where it is adept at ripping open sacks! A wide variety of wild fruits and berries feature in its diet, but it has become one of the most destructive of all bird pests, particularly in India, where it is notorious for raiding cereal and fruit crops, often in very large flocks, and causing terrific damage.

[*Psittacula krameri borealis*,
Corbett National Park,
Uttar Pradesh,
northern India.
Photo: Günter Ziesler]





Though not present in the alpine regions of south-east Australia, the Musk Lorikeet seems to share much the same distribution, habitat and food preferences as its congener the Little Lorikeet (*Glossopsitta pusilla*). It is difficult to determine the degree of competition there may be between them. Size could be a significant factor, the Musk Parakeet being the larger bird. This species, as its name denotes, gives off a distinctive smell, but what advantage, if any, this signifies, is unknown! It takes nectar and pollen, and seems particularly fond of the blossoms of eucalypt trees, as this photo suggests. Fruits, seeds, berries and even insects all contribute to its diet.

[*Glossopsitta concinna*, Australia.
Photo: Roland Seitre/Bios]

laid eggs and hatched young, but failed to rear them, in the old cup-nest of either a Eurasian Blackbird (*Turdus merula*) or an Olive Whistler (*Pachycephala olivacea*) on Maatsuyker Island off Tasmania, apparently since no *Melaleuca* trees on the island provided a nest-site. Moreover, an Eastern Rosella once occupied the deserted domed stick-nest of a *Pomatostomus* babbler.

Captive parrots have shown some capacity for delayed laying after insemination: females of three Australasian species have been known to lay fertile eggs 10 days or more after their mates died, the longest instance being 14 days by a Moluccan King-parrot. The adaptive advantage of this trait has presumably to do with the fact that incubation in parrots generally commences with the first egg while the laying of the full clutch often occupies well over a week, since eggs are generally only laid every second day, and sometimes with intervals of up to five days.

Commonly, the first nights spent by the female inside the nest-cavity shortly precede or coincide with the laying of the first egg. In many species the female is generally much more aggressive than the male in the vicinity of the nest; but in virtually all species it is also the female alone that incubates, apparent exceptions including the Alexandrine Parakeet, Vernal Hanging-parrot and Blue Lorikeet (*Vini peruviana*). These two facts in combination explain the sudden drop in nest defence when the first egg is laid, as in the Red-crowned Amazons mentioned above. Clutch sizes vary from one to three in the largest species to slightly more in most smaller ones, with up to 11 recorded in the Green-rumped Parrotlet; of three sympatric amazons in Mexico, the smallest, the Red-crowned, lays the largest mean clutch, and also fledges young earliest. However, in general, clutch size appears to correlate as much with seasonality as with body size, since lorries almost always only lay two eggs whereas many larger Australian open-country species lay three times as many. It is also correlated, at least in Green-rumped Parrotlets, with the rate at which the male feeds the female during laying. She is mostly provisioned with food by the male throughout incubation, but her short breaks from the nest may in-

clude brief foraging forays; in Cuban Amazons (*Amazona leucocephala*) in the Bahamas, provisioning took place around four times a day, morning and evening, occupying only around an hour in total. A food pass is initiated by the male, usually by calling to the female to join him outside the nest and tapping her bill with his own: their open bills lock together at right angles, with heads pumping to and fro.

The eggs of all parrots are white, as is typical of hole-nesting birds, and they are relatively small; thus unsurprisingly the young are altricial and generally appear to hatch naked, but some possess down to varying degrees. The Derbyan Parakeet replaces an initial thin hair-like down with a denser woolly down. Tucuman Amazon (*Amazona tucumana*) chicks have long white down covering their entire bodies, and their secondary down, acquired at two to three weeks, is much thicker than that of other amazons. Both cases can be explained as an adaptation to the cold of the high mountains in which they are reared, but this does not help with the tropical lowland Long-tailed and Red-breasted Parakeets, whose young, like those of Derbyan, hatch with long white down. The young of Ground Parrots have sooty down.

In the first week or so after hatching, the female stays on the nest, receives food from the male and distributes it among the young; food passes then commonly take place at the nest entrance. During the second week the female begins to share feeding duties with the male. This change is obviously related to the feathering of the young, which allows them to be left for longer periods without brooding, and to their nutritional needs, which grow with their body size such that two providers become increasingly more important. In the Bahamas race of the Cuban Amazon, both adults attend the nest together up to six times a day. In general at this stage females may or may not roost in the nest-cavity with the nestlings, depending on the species. Before fledging, the young birds spend time perching in the nest entrance, and the parents duly begin calling to them, apparently coaxing them from the nest. However, fledging itself is silent,

Most parrots have one simple but imperative requirement when about to breed, namely a hole, normally situated in a tree, dead or live, though other locations are not disdained. Existing hollows, or abandoned nesting sites of other species, for instance woodpeckers, may be used, suitably enlarged or altered to meet the circumstances. The destruction of trees within a parrot's territory can constitute a serious threat to its existence, even in areas where food continues to be abundant. Unfortunately, the problem may not be immediately apparent. Parrots are long-lived birds and the scarcity of youngsters in a given community may not become evident until many years have passed.

The Grey Parrot, a species found in a wide swathe across Africa, nests typically in hollows normally high up in tall trees. Most nests are solitary, but cases of more than one nest in the same tree are not unknown.

Eggs number 2-3 and incubation takes 3-4 weeks. This species is extremely popular as a cage bird on account of its skills of mimicry, and some individuals have been reported to have acquired a vocabulary of over 700 words, equivalent to that of a 7-year-old child.

[*Psittacus erithacus*
erithacus,
Ituri Forest, Epulu, Zaire.
Photo: Bruce Davidson/
Oxford Scientific Films]



and in the days following fledging, family parties maintain that silence except during food transfers.

The nestling period is unusually protracted, reaching extremes in species such as the Red-fan Parrot, which only lays 2-3 eggs yet appears to take up to nine weeks to fledge their contents. The clearest and most understandable exception to this condition is found in the Ground Parrot, whose young are capable of running from the nest at 18 days old, and whose nestling period is 4-11 days shorter than in similar-sized hole-nesting species. Nevertheless, despite the length of nestling periods, birds fledge at stages similar to those of other altricial species relative to their growth curves. In the case of the Spectacled Parrotlet, brooding continues until the oldest bird is about 13 days old. In larger broods, small nestlings are not brooded by their parents but by their older siblings, when they have developed their own capacity to thermoregulate. In passerines body temperature is correlated with rate of growth, and large broods tend to maintain high body temperatures; but in parrots nestlings appear to maintain a body temperature related to body mass and independent of brood size, so that small nestlings do not have a high temperature, even when brooded. This phenomenon may be related to the psittacid life history pattern of slow growth, delayed maturity and great longevity.

Although it is unsurprising, if incubation begins with the first egg, that nestlings should be staggered in size, the expectation might be that later-hatched birds would immediately be given minor preferential feeding treatment in order to reduce the differences between siblings. In fact, if anything the opposite appears to happen. Broods in which some birds seemed at least twice as well developed as others have been reported with such consistency from all continents that this curious inequality is clearly the rule rather than the exception, and may even be encouraged rather than countered in the early stages; certainly in Red Shining-parrots (*Prosopeia tabuensis*) older siblings receive about twice as much food per feeding as younger ones. A possible explanation may lie in the observation just made, that feathered nestlings are capable of brooding their younger siblings, and thus allow their parents to undertake more food-provisioning.

In Budgerigars, which are among the species that show extreme hatch asynchrony, early-hatching young slow their development towards fledging, and although they leave the nest early, the youngest sibling begs the most and actually fledges at the heaviest weight. Budgerigars happen to be birds that become independent virtually at fledging, so the pressure to fledge all young simultaneously is reduced; but the mechanism whereby the youngest bird begs and is fed the most may explain how siblings of very different ages and stages can actually synchronize their entry into the world and thus allow their parents to guard them more efficiently. All the same, it does not explain why the second and third chicks in macaw nests have significantly higher mortality rates than the first-hatched.

In smaller parrots up to at least the size of Monk Parakeets, young birds may be crèched, and sibling bonding can immediately replace the parent-offspring relationship (see General Habits). Within days the parents may renege; in the case of rosellas, the male provisions the young birds from the first brood for the 2-3 weeks while the female is incubating eggs of the second. At a nest of Yellow-capped Pygmy-parrots (*Micropsitta keiensis*) it was found that the young from the first brood were allowed to roost in the nest even after the second brood had hatched; possibly again some thermoregulatory value was achieved in this way. Thus, in some species in both the Neotropics and Australia, young birds band together in groups separate from adults (this habit may confuse field efforts to determine species limits in taxa where adults of one group share a character with juveniles of another). However, in many larger species there is a more protracted period of parental care. Puerto Rican Amazons (*Amazona vittata*), for example, remain with their parents in their natal valleys for around eight weeks before integrating into adult flocks. Juvenile macaws accompany their parents for at least as long –immature Hyacinths for as much as a year– and continue to beg for food, although they do so with decreasing success (expressed as a bite or lunge by the adult).

Despite the general pattern of slow growth, some of the smaller parrots are capable of rapid maturation. Budgerigars may become sexually mature at six months. With constant access to food, cap-

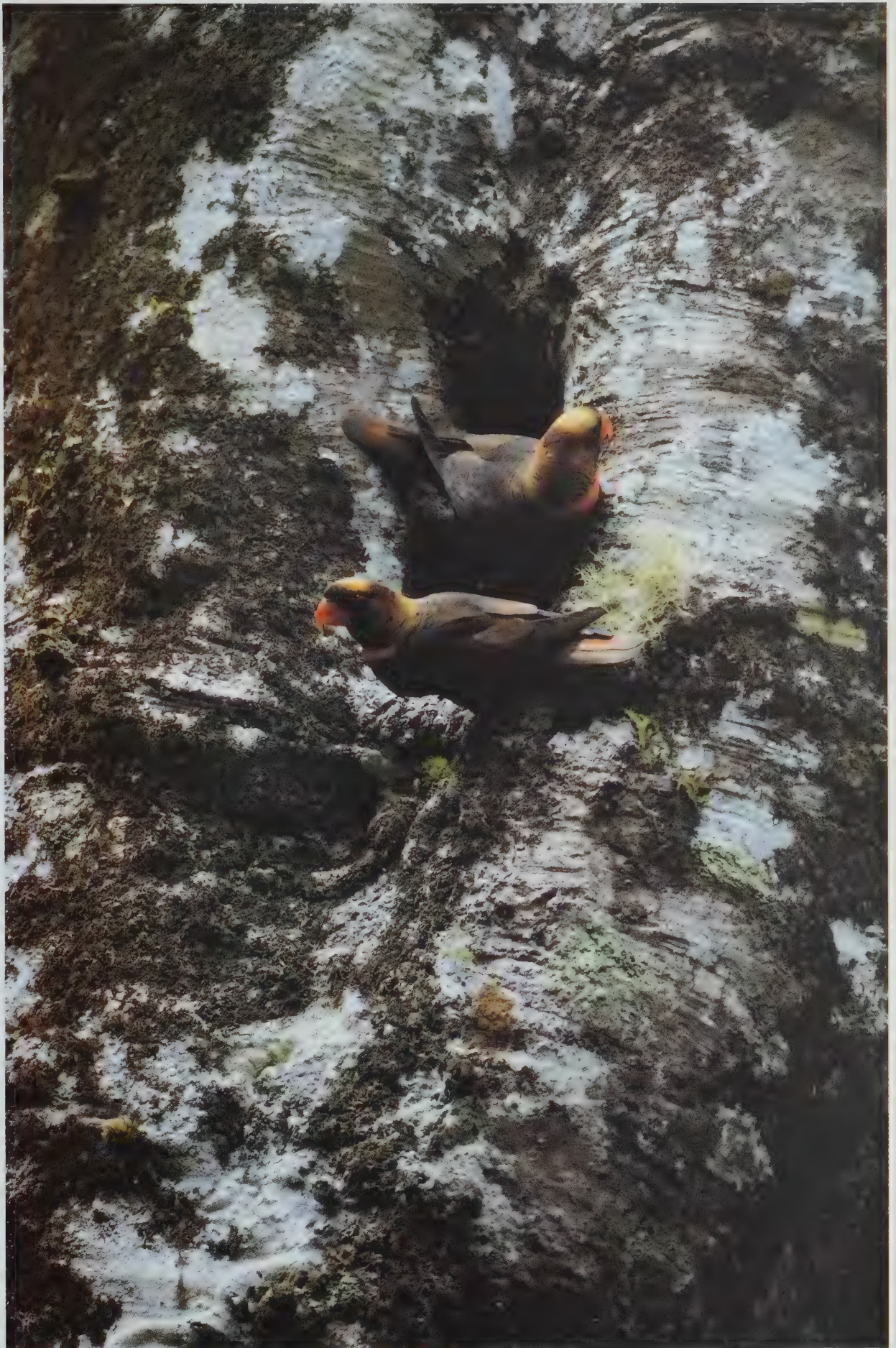


The Pacific Parrotlet shows extraordinary opportunism when it comes to selecting a nest-site. Though normally favouring a tree hollow, the choice can range from holes in fence posts or telegraph poles to pipes, bamboo rafters in houses, and the old mud-and-stick nests of other avian species; this pair seems to have fallen for the rather prickly comfort of an old woody cactus. No attempt at a nest lining is made; the 4-6 eggs are laid on the bare floor of the nest; two broods are sometimes reported.

[*Forpus coelestis*, near Guayaquil, Ecuador. Photo: Günter Ziesler]

Nest-sites, if they have proved successful, are often reused in the following breeding seasons. Many adult pairs of predominantly sedentary species may remain close to the breeding area in order to claim or reclaim their hole in good time. Territorialism is restricted in parrots to the vicinity of the nesting site, which is strongly defended, and sometimes a pair can be found in attendance at the hole several months before the eggs are laid. Both sexes participate in the work of preparation, enlarging perhaps the entrance or the hole itself, but little maintenance work is done if the site has been used for many years. All sexual activities take place at or inside the hole, or in a nearby tree. The Dusky Lory, a species of rain forest, prefers to nest in tall trees in the montane zone, choosing a hollow at some fair height above the ground, presumably to guard against possible predators. Though a common and gregarious species, very little is known about its breeding cycle in the wild.

[*Pseudeos fuscata*,
Papua New Guinea.
Photo: Günter Ziesler]





The Brown Parrot, or Meyer's Parrot as it is often called, is an African species with an extremely wide distribution, found in many kinds of wooded country, including miombo and dry Acacia woodland, showing a special penchant for baobab trees. In the breeding season it seeks a tree hollow, commonly using the old nesting hole of a woodpecker or a barbet, normally in a vertical branch; this hole it may retain for use in subsequent seasons. Some pretence of a lining is made, as is standard procedure in parrots, and the 2-4 eggs are laid on decaying wood dust at the bottom of the cavity. Breeding is reported from all months between June and December, occurring earlier in the south than in the north.

[*Poicephalus meyeri*.
Photo: J. R. Peek/Aquila]

tive lovebirds can be bred on a constant basis, and young birds become sexually mature at about 80 days, around 37 days after fledging. These are adaptations of species that live in unpredictable environments where opportunities for breeding may suddenly arise and must be seized. By and large, however, the proportion of breeding birds in a population of parrots in any one year is low. Thus only a third of the Grey Parrots in Ghana usually participate in the annual nesting cycle. Similar figures are shown even by the small Green-rumped Parrotlet; and in the prolific Monk Parakeet the proportion of adults breeding varied in one study from 37% to 60%. Work in Manu National Park in 1986 concluded that just two out of 20 or more pairs of Blue-and-yellow Macaws observed daily in one area were nesting, suggesting that pairs of this species might breed no more than once every several years. Only one of the two pairs appeared to be successful, so the evidence strongly implies that, even in pristine habitats in areas of Amazonia where annual fruit production is higher than elsewhere, breeding rates of Blue-and-yellow Macaws are exceptionally low. Moreover, year-round censuses of this species, Scarlet and Red-and-green Macaws noted that less than one fifth of all pairs were observed with young at the end of the breeding season. Such evidence has been vital in indicating how serious the removal of breeding-age adults from a macaw population might be.

The frequency of breeding in the Kakapo, and the level of breeding success in the Kaka, are directly related to food abundance. In the Kakapo the deferral of breeding over several years, until a significant masting event provides for the nutritional build-up and weight gain (see Morphological Aspects) of both males and females, is a strategy which minimizes waste of resources in unsuccessful attempts. Similarly, Kakas appear to depend on infrequent seeding of key beech species: in one South Island population, only one successful nest was found and only four of 31 radio-tagged birds attempted to breed within a six-year period, while on Kapiti Island in 1989 the number of active nests was just one third of the number in 1988, and their success was under one third of the success in 1988, with starvation the chief cause of mortality.

Movements

A remarkably small proportion of parrots can be described either as truly "migratory", which implies the seasonal transfer of entire populations from one region to another, or as "sedentary", which implies no movements further than some 50 km from origin. The majority of the family falls into the ill-defined area of migrations that are partial, dispersive, nomadic, irruptive, irregular and local. This condition is the result of the complex and sometimes unpredictable spatial and temporal patterns of fruiting and seeding in the wet and dry tropical and subtropical zones to which most parrots are confined. Moreover, most descriptions of psittacid displacements are deliberately vague and tentative because knowledge of this aspect of their life histories is as nugatory as it is difficult to acquire; one of the difficulties in teasing out information about movements from poorly studied birds is that many parrot species, including the Red-fronted Parrot (*Poicephalus gularis*) and Blue-crowned Parakeet (*Aratinga acuticaudata*) as notable examples, having been seen in the non-breeding period in noisy flocks, become exceptionally quiet and unobtrusive when breeding, such that they might be assumed to have left the area.

Full, seasonally driven migration, as classically understood, is only known to occur with certainty in two species, the Swift Parrot and the Orange-bellied Parrot, both of which breed in Tasmania and move the relatively short distance across the Bass Straits to spend the austral winter in south-east Australia. A third species, the Blue-winged Parrot, does the same thing, but in this case there is an apparently resident south-east Australian population over which the Tasmanian migrants are believed to leap-frog.

Complete sedentariness is slightly commoner, if only because a number of species are confined to islands too small to permit any wide-ranging movements. Most Pacific and Indian Ocean species, including the Neotropical Socorro Parakeet (*Aratinga brevipes*) and the various parrots of New Zealand and adjacent

The rosellas are a closely related group of Australian parrots, commonly called broad-tails or flat-tails, a direct translation of the generic *Platycercus*. The Northern Rosella lives in savanna woodland, coastal forests, occasionally mangroves, and trees growing along watercourses. It is mainly seen in pairs and small groups foraging for seeds on the ground. As breeding draws near, pairs begin to indulge in courtship feeding and display. The male squares his shoulders, ruffles up breast and tail coverts, wagging his fanned tail and chattering all the while. The nest-site is in the limb or trunk of a tree, typically a eucalypt standing near water. The clutch consists of 2-4 eggs, which the female alone incubates, leaving the nest briefly to forage for herself or to be fed by the male. Upon hatching, for the first few days the nestlings are tended by the female and then by both parents. The young birds become independent about a month after fledging, but they may remain with their parents until the following breeding season.

[*Platycercus venustus*, Katherine Gorge National Park, Northern Territory, Australia.
Photo: Jean-Paul Ferrero/Ardea]



waters, are sedentary, although at least one *Vini*, the Blue-crowned Lorikeet (*Vini australis*), and one *Cyanoramphus*, the Red-fronted Parakeet, sometimes move between islands. Philippine parrots, whether nectarivorous or granivorous, all appear to be largely resident, although some vertical displacements may occur in higher-altitude species. Virtually no other Asian or Australasian species can be said to be sedentary, with the notable exception of the rosellas, where ringing has shown birds to be strongly and continuously tied to the natal area. In one study, as many as 598 out of 2288 ringed Eastern Rosellas were controlled or recovered, and of these only one, marked as a juvenile, was found away from the ringing site: this bird was just 3 km away. Similarly, 146 recoveries of 1741 Crimson Rosellas yielded just six found away from the ringing site, the farthest one, again marked as a juvenile, being 20 km distant.

In Africa several *Poicephalus* parrots appear to be sedentary, although careful study might reveal a different picture; among lovebirds only the Grey-headed of Madagascar appears likely to qualify. In the Neotropics, Indigo and Red-fronted Macaws, confined to very circumscribed areas, appear always to meet their needs within them, and the same is true of the Blue-throated Parakeet, Yellow-faced Parrotlet (*Forpus xanthops*), Blue-bellied Parrot (despite earlier reports of movements into coastal areas) and possibly Spix's Macaw (*Cyanopsitta spixii*). The various parrots of the Caribbean islands are also largely sedentary, but some distinct seasonal shifts in numbers and presence are or once were recorded. Young Monk Parakeets do not disperse far, with average distance from natal to nesting site being only 1.2 km in one study.

Altitudinal displacements occur in many Andean species, including two amazons, both *Enicognathus*, both *Psilopsiagon*, three *Touit* and four *Pyrhura*; the only comparable movement to have been documented outside the Neotropics is undertaken by the Slaty-headed Parakeet of the Himalayan foothills, although the Australian King-parrot and the Ceylon Hanging-parrot show some vertical shifts in numbers with season, and Ground Parrots in Tasmania's uplands are as-

sumed to come lower in winter, since their breeding habitat gets blanketed in snow.

All elevation changes can be viewed as local seasonal movements that are simply easier to detect, in part because (presumably) entire populations are involved. Many other species are known or believed to perform seasonal migrations that are local in nature – meaning, here, undertaken in part but not all of the species's range and/or involving only a partial evacuation of areas, both of which make the determination of pattern all the more difficult. Examples include the occupation of Kangaroo Island, off South Australia, by the Elegant Parrot (*Neophema elegans*) in its presumed breeding period (November–April) only, and the Rock Parrot's presence on the same island apparently only after breeding (January–May); the Derbyan Parakeet's summer visitor status in north-east India; the Grey Parrot's dry-season wash into Ghana's evergreen forest for breeding; the Brown-necked Parrot's annual appearance on Zimbabwe's central plateau; the post-breeding displacements of the Red-spectacled Amazon (*Amazona pretrei*) north and east of its breeding areas; and the complex seasonal wanderings of the Great Green Macaw (*Ara ambigu*) in the Caribbean lowland and slope forests of Costa Rica. One of the most interesting, because apparently so local a phenomenon, is the mid-year invasion of Surinam's coastal sand-ridge forests by many Amazonian species, squeezed out of their normal habitat by food shortages at the end of the rainy season.

Many of the remaining species in which movements are known will doubtless prove to have more structured patterns of displacement than is covered by the term nomadism. Apparent wandering behaviour may prove to be long-distance coverage of a large home range; both the Cyclopsittini and Micropsittini may exhibit such patterns if they are not, in fact, sedentary. Nevertheless, opportunist response to food availability remains a clear life history strategy in some parrots, notably those whose specialization on one food exposes them to danger from periodic mass crop failure, such as the *Rhynchopsitta* parrots and Golden-



Some parrots are known for the peculiar habit of nesting in termitaria. Strangely, the termites do not seem to attack the birds and probably seal off the nesting area. Some species of Aratinga parakeet habitually nest in arboreal mounds: using only their bills, they dig a tunnel upwards into the mound at first, then, turning downwards for some distance, they finally hollow out a large nesting area. The case of the Peach-fronted Parakeet is not clear, as its breeding habits are practically unknown. One pair was seen leaving a hole in an arboreal termitarium, which tempts one to suggest that this individual may actually have been nesting inside, but the photographer was sadly unable to check.

[*Aratinga aurea*, Serra da Canastra National Park, Minas Gerais, Brazil. Photo: Luiz Claudio Marigo]

In its homelands of north-eastern Australia, the Golden-shouldered Parrot is so well known for its habit of nesting in termite mounds that it is often referred to as the "Antbed Parrot". The terrestrial mounds that it uses are of two types. It prefers spectacular, conically shaped mounds to lower, flatter ones, and the former may reach a height of over 2 m. Helped by the softening effects of the rains, the parrots endeavour, sometimes unsuccessfully, to dig out a long tunnel in the crumbling earth. This terminates in a spacious nesting chamber, where the clutch of 3-6 eggs is laid. Happily, there is compensation for these labours, in which both sexes participate. Since the temperature within the mound remains relatively high, the chamber acts rather like an incubator. Consequently the eggs or young chicks can be left unattended for hours at a time, leaving the female free to forage for herself, though she may still be fed by her mate. Incubation lasts about 20 days, and both parents attend the young, which leave the nest some five weeks after hatching, though they remain with their parents to form family parties.

[*Psephotus chrysopterygius*, southern Cape York Peninsula, Queensland, Australia.
Photo: Clifford & Dawn Frith/Bruce Coleman]





These Eclectus Parrots survey the scene from their nest-hole, alert to the possible presence of other claimants to the site. Characteristically, they choose to nest in a tall tree in a clearing or on the forest fringe. The hollow can be up to 600 cm deep and is invariably high, with one found 58 m up a giant fig tree. The clutch of two eggs is laid on a lining of wood chips. Reports of groups of up to 7-8 birds seen in attendance at nest-sites lead to the suggestion that birds from previous broods may help in the raising of the young. This species is remarkable for its extreme dichromatism, so much so that the sexes were long considered to be distinct species.

[*Eclectus roratus macgillivrayi*, Iron Range, north Queensland, Australia.
Photo: Hans Beste/Ardea]

plumed Parakeet (*Leptosittaca branickii*), for example (see Status and Conservation). Elsewhere in the Neotropics, many macaws, amazons, *Aratinga* parakeets and *Pionus* parrots appear to wander after breeding in unpredictable directions, and a few species, notably the Yellow-faced Amazon (*Amazona xanthops*) and Scarlet-shouldered Parrotlet (*Touit huetii*), seem sometimes as unpredictable in their breeding as in their non-breeding distributions. In Asia and Papuasia perhaps only two species, the Blue-rumped Parrot of the Greater Sundas and the Blue-collared Parrot (*Geoffroyus simplex*) of New Guinea, may match the pattern where breeding areas are as movable as non-breeding ones, but the nectar-dependent Loriinae and *Loriculus* remain too little known to exclude them from this category. However, plant phenology on the islands from Wallacea east to the Solomons is almost certainly so continuously staggered through the year that nectar-feeders probably only rarely encounter spatial bottlenecks that render large areas uninhabitable for more than a few weeks. Nevertheless the substantial daily flights so commonly reported, and so utterly uncomprehended, in lorries and lorikeets indicate that birds are under constant pressure to keep pace with the ever-changing conditions of their feeding environment.

Some species, including three out of six *Eos*, at least three other lorries, the Great-billed Parrot (*Tanygnathus megalorynchos*) and Blue-topped Hanging-parrot (*Loriculus galgulus*), exhibit their post-breeding nomadism as island-hopping. However, this remains a very poorly documented phenomenon; the distances they traverse over water, and with what regularity, are unknown. Indeed, one of the intriguing questions is the age-structure in wandering flocks. In two well studied species, the Kea and Eastern Rosella, these flocks are composed of younger birds yet to establish themselves within the optimal habitat occupied by the adults. Many records of nomadic behaviour in parrots, including perhaps island-hopping, and also the phenomenon of wandering by otherwise sedentary species such as rosellas and lovebirds on the fringe of their ranges, may primarily refer to dispersive or displaced immatures.

One of the key causative factors in parrot movements is water. In arid and semi-arid environments on all continents the shifting availability of water sources explains many observed inter-forest and other displacements. The nomadism of some species of parrot in the dry interior of Australia is certainly related to rainfall distribution, green growth and drinking water. However, while harsh conditions require some species to be essentially nomadic, a few are better characterized as irruptive. These include the Princess Parrot, which appears to have a core population around Lake Tobin but which, after several favourable years, builds up its numbers to irrupt opportunistically into many other parts of the interior; and the Scarlet-chested Parrot and, less certainly, the mysterious Night Parrot, neither of which is yet known to have a single core area into which it retreats in times of climatic harshness, but both of which have provided evidence that several such areas may exist.

Relationship with Man

Man has a pronounced love/hate relationship with parrots, although the people who love them and those who hate them are not the same. Parrots are loved, of course, for their companionship, personalities, colours, and, in particular, ability to talk; they are hated for their adverse impact on human food production. Between these two extremes they are for trappers, seeking to supply the demand either for living pets or for much-prized feathers, simply a commodity to be utilized with dispassionate resolve.

The value attached to parrots as talking companions is reflected in the very derivation of the name, corrupted from the French *Perrot* or *Pierrot*, diminutive of *Pierre*. European explorers, wherever they went in the tropics, almost invariably encountered local tribes that had tamed some form of parrot, and experience quickly showed that no other kind of bird could more easily be kept alive on board ship and brought home as living testimony of the voyage; and the novelty of an animal that talked



Posing exquisitely outside a large tree hollow, these Hyacinth Macaws display all the beauty of their shape and colour. The largest and arguably the most spectacular of all the parrot species, the plumage is a deep rich blue overall, relieved only by the naked yellow eye-ring and bare skin at the base of the lower mandible. This pair was observed to carry out an inspection of the cavity, presumably with a view to subsequent occupation. Depending on availability, these macaws use hollows in tall trees, especially in the trunks of palms. They are also recorded as nesting in cliff holes that present the advantage of being more difficult of access to ground predators. Only two, very occasionally three eggs are laid, the female being entirely responsible for their incubation. The nestling period is a protracted 3-4 months, a length normal in the larger parrots, but it is rare for more than one youngster to be successfully reared.

[*Anodorhynchus hyacinthinus*,

Mato Grosso, Brazil.

Photo: Luiz Claudio Marigo]



A male Budgerigar feeds its mate at the nest-hole. In this species cere colour identifies the sex, since it is blue in the male and brownish in the breeding female. Nesting is often communal and may take place in any month of the year after good rains have fallen. There may even be two breeding seasons if circumstances permit. Budgerigars, perhaps the world's best known parrots, owe their name to the aboriginal word "betcherrygah", roughly translatable as "good food", and their initial popularity to John Gould, the famous nineteenth century bird illustrator, who introduced these birds into Europe, describing them aptly as "the most animated, cheerful little creatures you can possibly imagine."

[*Melopsittacus undulatus*, Pink Lakes National Park, Victoria, Australia. Photo: David Watts]

could not be underestimated. Indeed, the first parrot known to be mentioned in any human writing, a century before Aristotle, was a Plum-headed Parakeet (*Psittacula cyanocephala*) that could speak an "Indian" language.

The fascination exerted over man by parrots had an early manifestation in the annals of the Roman Empire, when individual favourites were kept in tortoiseshell and ivory cages with silver wires, while their less fortunate relatives were prepared as delicacies for luxurious banquets; one emperor is even said to have fed them to his lions. In the two thousand years since then parrots have remained by far the most familiar and popular of avian pets. There can, of course, be no question that they provide large numbers of people with the innocent pleasure of company and care. The therapeutic value of pets to man is now known to be high, and it is probably highest in those animals, dogs and parrots in particular, with which people feel most able to communicate verbally. Parrots themselves often bond strongly with their owners, and it appears that they in turn derive comfort and interest from these relationships. It is a bitter paradox, however, that, although they may no longer directly supply the extravagances of emperors, they certainly continue to suffer the incidental and largely unheeded consequences of human possessiveness and wonder: the path from forest to front porch is littered with the corpses of the less fortunate, and is darkened by an untold history of suffering that no animal-lover would normally countenance or accept responsibility for.

To date, however, the only major international legislation enacted in relation to trade has been for taxic rather than individual protection. This is CITES, the Washington Convention on International Trade in Endangered Species, to which 134 countries were party at the end of 1996. CITES identifies those species for which trade has potential negative effects: on Appendix I of the convention go those forms whose conservation status is so adverse that any trade is deemed unacceptable; on Appendix II go those forms whose conservation status is such that trade might pose a threat

unless properly regulated by permits. Ever since 1981 all Psittaciformes, with the exception of the Rose-ringed Parakeet, Budgerigar and Cockatiel, plus of course those on Appendix I, have been listed on Appendix II. The main reason for such blanket listing is that many of the rarer parrots resemble some of the commoner ones, and could easily escape correct identification at national frontiers.

In theory, then, CITES provides a substantial filter on parrot trade around the world. In practice, some parties have not met their obligation to introduce domestic legislation adequate to fulfil their requirements under the convention, and in any case a great deal of smuggling takes place. In this latter regard the most notorious of all parrot victims must be Spix's Macaw, which has been on CITES Appendix I ever since its creation; private ownership of this macaw was even prohibited under Brazilian law in the 1960's. The species was not rediscovered in the wild, other than by trappers, until 1985, by which time all but five birds had been spirited into the hands of some of the world's richest collectors; four of the remaining wild birds went the same way within three years. No amount of legislation on its own was adequate to help so coveted a species. In some ways even more alarming was the way in which the listing on Appendix I of the Hyacinth Macaw actually increased its international trade, apparently as collectors only then realized its rarity and consequently began offering inflated prices for specimens: once again, practice held sway over principle.

Singapore has the shameful distinction of being the entrepot for an enormous volume of illegally exported birds, including the rarer Neotropical species. The state authorities allow wildlife traders to operate with impunity, and the business has brought enormous wealth to a few dealers, who appear to be able to acquire any parrot they want other than ones from Australia and New Zealand. For example, the Red-and-blue Lory (*Eos histrio*) from the islands north of Sulawesi, Indonesia, is currently being "vacuumed" out of existence by a demand led covertly from Singapore.

Undoubtedly the best known psittacid victim of trade is the African Grey Parrot, which is listed on CITES Appendix II. As a "talker" the African Grey has no equal, and birds from the western end of the range of the nominate subspecies, in Ghana, are judged to be the most intelligent and trainable. The species also represents good value for trapping effort compared to other forms of wildlife: handling is not dangerous, mortality is lower than in passerines, and profit margins are good. Ghana has therefore long been one of the major exploiters and exporters of the Grey Parrot. This is pre-eminently the type of species CITES is intended to help, by ensuring that trading nations acknowledge scientifically determined limits on the number of birds taken each year from the wild; yet until very recently no quantitative assessments of its status had ever been undertaken in Ghana or anywhere else, so that the fundamental premise of the species's ability to sustain utilization was based on nothing more solid than assumption.

In the past the birds were used for food, company, magic and income but, although trappers will still eat birds they cannot sell, there is little place now in Ghana for parrots as food or pets. Their use in magic is also greatly diminished, but the demand for body parts, and in particular the red tail feathers, is strong in Togo, Benin and Nigeria, mainly as a supposed aphrodisiac. The tail feathers can, of course, be plucked from the bird without killing it, so this demand has mainly been met by the wild bird

trade. However, plucking causes great distress to the birds, and infections and mortality commonly result. Unfortunately, banning this practice would probably fuel much illicit hunting, since the consumers have no interest in whether the birds yield their feathers alive or dead.

Three types of trapping are used in Ghana, chief among them being luring. A fairly low tree is selected within a kilometre of a roost, a hide built in the crown, and sticks coated with a preparation of *Landolphia* vine latex placed in the canopy. Several captive birds amongst the limed sticks act as visual lures, while a bird specially trained to give distress calls is kept to hand by the concealed trapper. When a flock of wild birds flies over, the trained bird is squeezed and gives its calls: the wild birds circle in curiosity, and some invariably land near the visual lures and become stuck. These are mainly young, naive birds, so the most productive time for the trapper is in the post-fledging period from March to around July, with success tailing off dramatically by November.

Two other methods are simply to lime the customary "staging tree" in which many birds settle before descending to roost, and to take birds, including the roosting adults, from nests. The former has the advantage of use at any time of year, but is very disruptive to roosts; the latter results in birds in good condition, but only has a very limited period of application. Neither method has anything to commend it in terms of sustainability. Luring is

Despite their gregarious nature, comparatively few parrots breed colonially.

One of these, the Burrowing Parakeet, tunnels into sandstone or limestone cliffs to make its nest-hole, frequently at a considerable height above the ground, overlooking a river or at times the sea.

The burrows, often intersecting to form an intricate network of passages, may be as much as 3 m in depth, ending in a nesting chamber. As they approach their cliff holes, sometimes in groups, these parakeets show masterful split-second timing, gliding in at speed and only folding their wings at the very last critical moment.

Formerly widespread and common in Chile and Argentina, they have been the victims of much ruthless persecution and in parts of their range have been reduced to a few isolated colonies.

[*Cyanoliseus patagonus patagonus*, Chubut, Argentina.
Photo: Günter Ziesler]



thus by far the best practice in management terms, by taking such a high proportion of young birds (80-97% of totals caught), some of which might be likely to die of natural causes in their first year anyway. These young birds also make the best pets and are much more amenable to captive life. However, luring is little different in terms of distress to the captured birds. Traditionally each limed bird was placed in its own sack while the collection was proceeding, but to save time the modern treatment is to clip its wings and throw it out of the tree, with sometimes immediate and sometimes long-term consequences: wing-clipped survivors of the fall are far less efficient at feeding themselves. Once gathered together the birds have their tail-feathers plucked, for the reasons explained above, and are usually crammed into cages that allow them no space to care for themselves.

Mortality between capture and in-country quarantine is claimed to be as low as 3% in Grey Parrots, but this needs independent assessment. In Fischer's Lovebirds trappers claim 5-10% for the same phase, although this can be much higher depending on the experience of the trapper and the distance to be travelled; since lovebirds need water every day, a two-day journey on top of a bus with water that has slopped and spilt in the first hour will kill the entire consignment. In Mexico, 55% of parrots trapped for trade are estimated to die before their first sale. Whatever the case with the African Grey, another 5-10% die in a month-long quarantine, double this amount if the stay is two months. Mortality on the export flight is generally 2-3%. Then there follows a second period of quarantine, in the importing country. Here figures vary, but up to 28% has been recorded. Cumulatively a minimum of 15-50% of Grey Parrots may die between capture and final destination. For Fischer's Lovebirds the equivalent figures are 18-44%.

As the death toll mounts, so too does the price of the individual parrot. In the early 1990's a trapper could sell a Grey Parrot for the rough equivalent of US\$5, the middleman for \$20, the exporter for \$70, and the importing retailer for almost \$500. Precisely the same inflation attends the Blue-fronted Amazon (*Amazona aestiva*), sold for \$4 each by the *campesino* to the "collector", for \$8 by the collector to the exporter, and eventually retailing for \$400 in Europe and the USA. Such trade is clearly extremely lucrative for all concerned: some Ghanaian exporters bought flats in London on the proceeds of Grey Parrot exports, and such is the potential for making money in this business, despite the ban in place since 1986, that many traders have attempted smuggling via Ivory Coast or Togo, often only to incur financial losses from the transport costs, bribes needed, and defaulting payments. Trappers living near the border can more easily trade their birds, however, and the combined effect of this is that some 80% of all Grey Parrots exported from Ivory Coast are actually trapped in Ghana.

Clearly, then, parrots are good business. Throughout the world, the net CITES-reported international trade in psittaciforms, 1982-1988, was an average 539,701 birds per year; these are minimum figures, as some CITES parties failed to report trade statistics, other countries are not parties to CITES, and the level of smuggled parrots is known to be high but remains unquantified. It has been estimated that trappers in Neotropical countries earned US\$33,000,000 gross in the period 1982-1986, with middlemen earning \$114,000,000 gross, while the gross retail value in importing countries reached \$1,600,000,000. The human dimension is illustrated by Guyana, where almost all of the avian exports are parrots: in 1991 a total of 16 exporters provided employment for 430 people, with some 7540 trappers and traders also involved; factoring in spouses, children and associates, about 54,000 people, some 5% of the country's population including the majority of the Guyanese Amerindians, would then have been deriving financial benefit from the psittacid trade. The total declared value of birds exported to the USA from Guyana in 1986 was US\$1,400,000, accounting for 0.6% of all Guyanese exports in that year.

Three closely related issues emerge from these figures. First, there ought to be considerable economic incentive to ensure that the trade is sustainable, so that people may continue to benefit from it. Second, there is an unjust disparity in the value of the parrots at capture and the prices exacted for them from their fi-

nal owners. Third, there is a burning question whether such economic and human benefits should outweigh either the welfare and freedom of the birds themselves or the conservation interests of the species from which they derive.

Australia's long-standing ban on the export of all its wildlife has been held up as a model of conservation and indeed welfare legislation, defining the situation in the clearest and simplest manner. However, for less developed countries, and for those with long land frontiers, the total ban solution is far less easy to implement. Mexico prohibited all native wildlife exports in 1982, but this had no practical effect whatsoever: estimates of the number of parrots smuggled into the USA later in the decade varied from 25,000 to 150,000 annually. Moreover, the blanket ban appears to be a major disincentive to habitat and site conservation for, if no economic value can be attached to the retention of parrot-productive areas, the economic benefits of their conversion inevitably come into consideration. In such circumstances, the right of developing countries to utilize surpluses in their wildlife populations, as a legitimate means of generating income and employment, is difficult for the developed world to deny. Certainly if bans simply drive trade underground and/or result in the destruction of the habitat of the birds in question, which is effectively to condemn them to death by starvation, little is gained either for their conservation or for their welfare.

As a consequence, it has been argued that the solution lies in fuller management and stronger assertion of CITES principles. It is clearly in the interests of suppliers and conservationists alike to ensure that the traffic in parrots is sustainable, and if the trappers could achieve a better share of the profits then the treatment of the parrots themselves might improve to the point where welfare outrage would acquiesce. A welfare-sensitive sustainable harvest regime requires a comprehensive management framework involving such things as scientifically determined capture and export quotas, greatly improved trapping and export procedures, agreed systems of pricing, foreign exchange generation, profit-sharing with local communities, and full, independent monitoring of populations, habitats and all trade practices. This, at any rate, is the ideal. In addition, it has been suggested that various management interventions could greatly improve the yield, such as adding nest-boxes to increase nest-site availability, predator-proofing existing nest-sites, providing supplementary food, and "pulling" first clutches so as to encourage multiple clutching, the aim being to boost the number of nestling parrots, which make the best pets, so as to harvest the surplus without in any way affecting existing population levels. There is much difference of opinion over whether a moratorium on parrot trade, while the potential for sustainable harvesting is being investigated, would be effective or counterproductive in terms of its impact on parrot populations.

The cardinal issue is co-operation between parties on an agreed and equitable basis. In Argentina, the exploitation of the Blue-fronted Amazon is so riven with rivalry for the short-term profit that nest-trees are readily cut down to obtain nestlings, and indeed entire *campesino* families deploy themselves to guard nests day and night as "harvest" time approaches. As many as 100,000 nest-trees were either destroyed or irreparably damaged for nesting purposes in the period 1981-1989, and the taking of every nestling even from trees left standing has led researchers to predict a major population crash in Argentina in the 1990's. Already it was noted that an area that produced 3000 nestlings in 1986 yielded only 500 in 1991, and falling numbers have now resulted in a new illegal trade in the species out of Paraguay. In such a vicious circle everyone ultimately loses, and most of all the parrots: a rationalized system of ranching may offer the only hope.

It may also offer the only hope against the control of unscrupulous smuggling. In the period 1975-1984 trappers virtually eliminated the large macaws from a California-sized area of forest in lowland Bolivia, the spokesperson for the middlemen boasting of exporting around 500 birds a fortnight, a putative total of 130,000 birds. Bird-fanciers with inside knowledge of illegal trade reported a minimum 10,000 Hyacinth Macaws taken from the wild in the 1980's, with one astonishing but presumably ex-

This historic photo is the first ever taken of an adult Orange-bellied Parrot with chicks. This Endangered species, with an estimated population in the wild of fewer than 200 birds, now breeds only in south-west Tasmania, migrating in winter to the Australian mainland. The nesting hole is usually up to 25 m from the ground in a living eucalypt; 3-6 eggs are laid. While the female Orange-bellied Parrot incubates she is fed by the male. Parrot chicks are highly altricial; most hatch without down and require constant brooding, but within two weeks the female Orange-bellied Parrot begins to share feeding duties with her partner. As the chicks grow, the feeding, by regurgitation, may take place as often as three times an hour. Despite the asynchronous egg-laying of parrots, these chicks appear to show surprisingly little difference in size and are already quite well feathered. After fledging, the juveniles of this species often form groups of up to 15 individuals and remain together, even though their parents may already have departed on their migration to the mainland.

[*Neophema chrysogaster*,
Tasmania.
Photo: Dave Watts]





The Princess Parrot was named after royalty in a fashion current in the mid-nineteenth century, when many species were being discovered. A highly enigmatic parrot, found only in the interior of western and central Australia, its appearances are so sporadic and unexpected that its status is largely unknown. Probably an opportunistic breeder, it may nest at any time of year after good rainfall. The nest-hole is usually in a eucalypt near water, and several pairs may nest in a small colony, with as many as ten pairs found in the one tree. After fledging, both parents and young depart from the breeding area almost immediately. Note the spatule visible on the end of the wing, a peculiarity of this species.

[*Polytelis alexandrae*, Australia.

Photo: Roland Seitre/Bios]

aggregated claim of up to 300 a month for three years. CITES returns do not, of course, disclose any of this despoilment, and in the absence of the political will to beef up patrolling and enforcement there seems no alternative but to provide an incentive for the more honest among the trappers to become policemen on their own as well as the parrots' behalf.

None of this, of course, relates to the problem of internal trade. In certain countries, notably Brazil and Indonesia, domestic demand for parrots is very high but virtually uncharted. In these and their adjacent countries the use of parrots, and especially their feathers, by native tribes is another important dimension. Macaw flight feathers are much used in Amerindian head-dresses. Pesquet's Parrot plumes have major value in many New Guinea societies in relation to bride purchase. Skins of Black-capped Lorries (*Lorius lory*) are often worn by the natives of the middle Sepik River as dance ornaments. In the southern Cook Islands in ancient times the small red feathers of the Rimatara Lorikeet (*Vini kuhlii*) were much prized for the adornment of people, god images, caps and elaborate ceremonial head-dresses. Overexploitation of these small parakeets seems to account for their loss from the southern Cooks, and indeed there is good evidence that many long-distance inter-island voyages by Polynesians were spurred by the desire to obtain lorikeet feathers. Clearly, they often took a number of birds with them, which led to various species becoming established on islands outside their natural ranges. Thus on Aitutaki, in the southern Cooks, the loss of the Rimatara Lorikeet made it possible for Blue Lorikeets to establish themselves when brought there some time before the start of the twentieth century.

Often, however, introductions of parrots are regarded with concern, because of their potential to inflict economic damage on foods during cultivation. Of the 353 psittaciform species no fewer than 54 (15%) appear to be considered as crop pests in some degree or in some contexts. Almost inevitably the two worst offenders within their natural ranges, South America's Monk Parakeet and the Afro-Asian Rose-ringed Parakeet, are also the two best colonizers of man-modified habitats outside those

ranges, and both are greatly feared in consequence. Neither is able to withstand cold winters, however, so it is in the southern parts of the USA and in the Mediterranean basin that their populations are most likely to find a firm grasp. As an example of the damage Rose-ringed Parakeets can do to orchard crops like citrus, almonds, *Cordia*, papaya and dates, in one calculation where the estimated loss of citrus was 8.6% of a total of 864,300 t, the loss to India in foreign trade earnings in 1986 was calculated at Rs 146,000,000, or about US\$11,000,000. Compounding this is the fact that the skin ruptures produced by parakeet attack expose crops to infestation by fruit-flies, which can then totally ruin what the birds began.

Prognostications are not always on target. There were expectations that Grey Parrots, for which oil-palms are a natural food, might become a serious pest in oil-palm plantations. However, it turned out that the plants are so productive that only a tiny fraction of their daily output could ever be eaten by the parrots, whose numbers have not so far increased in response to the suddenly much increased quantities of the food, probably because of the limitation on reproductive output represented by the number of nest-sites. In Western Australia, too, the large cockatoos cause far greater losses than smaller birds such as Red-capped Parrots, Western Rosellas and Port Lincoln Ringnecks (*Barnardius zonarius*): in any one season during the period 1973-1975, no single orchard suffered losses greater than 1.4% of the total fruits grown. Moreover, researchers have found a solution to the problem in growing foods that decoy birds away from commercially valuable plants. In the case of the Regent Parrot (*Polytelis anthopeplus*), for example, it has been proposed that sudan grass (*Sorghum sudanense*) can be planted both as a wind-break and as a decoy, since it supplies a preferred food source right through the period of orchard fruiting. In Argentina, the relatively negligible damage done by Blue-fronted Amazons to citrus orchards, which is used as an excuse for trapping birds, could be prevented through improvements in agronomic practices, patrolling, and bird-scaring devices. Possibly the same could be done with the hapless Burrowing Parakeet, which with its

Screeching flocks of Austral Parakeets seem strangely out of place as they fly around in the temperate beech (*Nothofagus*) and oak forests of southernmost Chile and Argentina.

In the northerly part of their range they are found up to 2000 m, coming lower in the winter, but further south they are resident all the year, despite the severe climatic conditions. The favourite nest-sites are tree hollows or abandoned woodpecker holes in large dead oaks.

Remarkably for parrots, Austral Parakeets prepare a deep hole by filling it with specially broken twigs and a layer of dry leaves and feathers on top. If no suitable hole is available, they are reported to build their own nest of dry twigs and grass stems in the dense tangles of *Chusquea quila* bamboo. Apart from the fact that the clutch consists of 4-6 eggs, little is known about their breeding behaviour in the wild. The two nestlings peering out of the narrow nest entrance appear as small replicas of the perched adult bird, complete with brownish forehead patch and dark edges to the feathers.

[*Enicognathus ferrugineus ferrugineus*,
Torres del Paine
National Park, Chile.
Photo: Günter Ziesler]





Scarlet Macaws offer a brilliant splash of colour, as they glide over the Amazon rain forest in Brazil. Certain macaws, including the Scarlet, are known to move seasonally in search of fruiting trees, but no clear pattern is discernible, except that in summer they habitually penetrate into semi-arid forest in Colombia. Large numbers of Scarlet Macaws used to visit Pacific tropical forest and swamp regions in Mexico, but all those birds have long since disappeared, emphasizing the dismal decline in numbers of this spectacular species.

[*Ara macao macao*, Mamiraua Sustained Development Reserve, Amazonas, Brazil. Photo: Luiz Claudio Marigo]

innocent adoption of cereal grains in what were once its empty grassland habitats has prompted unsavoury retaliation in the form of dynamiting of whole colonies and mass poisoning of feeding flocks.

Status and Conservation

Based on the most recent (1994) assessment of globally threatened parrots by BirdLife International, 86 (26%) of the 332 psittacids in the world are at risk of extinction, with a further 36 "near-threatened"; indeed, if one includes the 21 cockatoos within the Psittacidae, this means adding seven threatened species and four more "near-threatened". It is a proportion unmatched by any other large family of birds, and testifies to the peculiar vulnerability of parrots both in environmental terms and as an economic resource, for it is the combination of habitat destruction and trapping for trade that is responsible for this exceptionally high rate of threatened members of the family.

There is, however, a third element involved, namely range size. In an analysis of avian species with ranges of less than 50,000 km², aimed at identifying critically important centres of biological endemism ("Endemic Bird Areas" or EBA's), BirdLife established that no fewer than 63 (68%) of the 93 threatened psittaciforms are restricted-range species, and that as many as 127 (36%) of all parrots and cockatoos have this characteristic. The ratio of threatened to non-threatened restricted-range species (1:1) shows the relevance and value of range size in judging the conservation status of taxa; but the sheer number of restricted-range parrots itself also reveals the success of the family in colonizing virtually all tropical wooded habitats on all continents and the great majority of islands.

However, the susceptibility of the family is further, and perhaps even more poignantly, illustrated by the 18 parrot taxa listed in 1981 as having become extinct between 1600 and 1980, a figure only then matched by the rails, notorious for their defencelessness against rats and cats on oceanic islands (see Volume 3, page 138). In addition, the documents of early travellers and settlers have revealed that many more species of parrot, notably in the West Indies, existed at the time of the European voyages of discovery than the physical record shows. The West

Indies appear to have been particularly rich in macaws: among those with the most convincing written evidence of their existence are *Ara erythrocephala* and *A. gossei* from Jamaica, *A. atwoodi* from Dominica, *A. martinica* from Martinique, *A. guadeloupensis* from Guadeloupe and *A. erythrura* from an unknown island. Other accounts refer to amazons and parakeets without further specification, on islands where none exists today. In some cases the birds involved may have been escapes brought in from the American mainland; but overall it is clear that a substantial proportion of the parrot fauna of the West Indies was lost in the four centuries following their discovery, and small testimony to this are the 15 or so specimens of *Ara tricolor* from Cuba and the single bone of *A. autochtones* from St Croix.

These extinctions are not easily traceable to cause, since they occurred so long ago, but we can infer some explanations by reference to conservation biology in general and parrot, notably macaw, biology in particular. To begin with, island birds of any family are commonly less well adapted to cope with mammalian predation pressures than continental forms, since they evolved in the absence of such pressures: when animals such as rats enter their environment for the first time the birds do not recognize them as dangerous and have no behavioural mechanisms to prevent the loss of themselves or more often their nests. Perhaps of greater import, the survival prospects of any relatively large frugivore on any relatively small island will be seriously prejudiced by the loss of a part of its habitat, and, as the remaining area diminishes, the chances increase that a fruiting failure will leave the birds nothing to eat for a long enough period that they starve: this is, of course, one of the reasons why any species with a circumscribed range is likely to be more susceptible to extinction than one that extends more widely. Finally, the written record tells us again and again that the human colonists of the Antilles sought out the larger parrots for food: indeed, such direct persecution of island birds has been a common cause of their extinction around the planet: there is, for example, a woodcut dating from 1602 showing men catching large parrots on Mauritius, doubtless the macaw-sized, weak-flying *Lophopsittacus mauritianus*, which died out probably around 1680, while the existence of three *Vini* parrots (two of them totally extinct) on the Marquesan island of Ua Huka has only been determined from

Spix's Macaw teeters on the very brink of extinction in the wild; these two historic photos taken in 1990 tell of its tragic fate. The first shows the one known survivor when it was located by members of a Brazilian team of scientists, and was seen repeatedly perched in a caraiba tree. The second shows the bird in the same tree, this time in the company of a Blue-winged Macaw. This strangely assorted pair were observed together over a five-day period and from the posturing behaviour of the Spix's Macaw it was thought to be a male. Subsequent tests carried out on its feathers in 1995 confirmed this, and a captive, wild-caught female was released back into the wild to join it. Unfortunately, the pair did not form a bond, most probably because of the strong relationship the male had already established with the Blue-winged Macaw. After some time the released bird disappeared. Recent reports confirm that the male Spix's Macaw is still alive and paired with the Blue-winged female. Indubitably, unscrupulous trapping and trafficking in the species led to the ultimate denouement, but the underlying cause of its decline has been the gradual and now almost total elimination of the caraiba woodland on which it relies to provide suitable roosting and nesting sites.

[*Cyanopsitta spixii*,
Propyrrhura maracana,
Curaçá, Bahia, Brazil.
Photos: Luiz Claudio
Marigo]





the middens of the earliest Polynesian settlement dating to 1500-2000 years ago.

The importance of the island factor, involving range restriction and biological defence reduction, can be gauged from the fact that 16 of the 18 forms listed as extinct in 1981 were from islands. There are, however, two notable parrot extinctions from continents, the first of which is absolutely certain, the second virtually so: the Carolina Parakeet in North America, and the Glaucous Macaw (*Anodorhynchus glaucus*) in South America. The Carolina Parakeet occupied a huge range from the eastern seaboard south from Virginia and west as far as a line from Nebraska to Texas. Within this area it lived in heavily forested river valleys, the same habitat as its equally famous partner in death, the Ivory-billed Woodpecker (*Campephilus principalis*). Because the woodpecker lasted far longer, habitat loss could not have been the sole cause of the parakeet's demise; but because the parakeet's decline was steady and not sudden, disease has been ruled out as well. The species was not a specialist feeder, like the nomadic Passenger Pigeon (*Ectopistes migratorius*), perhaps the most famous of all North American losses, although it would readily switch from its abundant weed and tree seed diet to cultivated fruit. It appears, therefore, that it was straightforward human persecution, partly in reprisal for its orchard raiding, partly for the cagebird trade, that caused its demise, but the evidence is by no means conclusive.

The Glaucous Macaw was far less well known, but because of its very close relation to Indigo Macaw the reasons for its disappearance are more confidently discernible. Glaucous Macaws actually vanished so early that naturalists in Europe in the early 1800's only knew them from live imports brought in by traders with no knowledge of their precise origins. The few details of their history and distribution have had to be compiled from reports of travellers who were not sure what they were seeing, naturalists who happen to mention blue-green macaws with yellow faces glimpsed in the course of voyages up rivers or through swamps; it is still possible that one day some old forgotten chronicles of early life in southern Brazil, Paraguay or northern Argentina will reveal more information about these

mysterious birds. However, because the bills of the Indigo and the Glaucous are the same size, and the Indigo appears to have evolved to crack the nuts of licuri palms (*Syagrus coronata*), Glaucous Macaws are assumed to have tackled similar-sized nuts: and the palm that produces the closest match to licuri within the lost bird's range is the yatay (*Butia yatay*), which experienced devastating levels of clearance in the last century as the River Paraguay basin was settled by cattle ranchers. It appears that the collapse of this food resource, doubtless coupled with hunting, sealed the fate of this magnificent parrot, unless in some remote tract of an Argentine *estero* a small population has somehow managed to survive.

One parrot killed off by persecution compounded by habitat loss, the other by habitat loss compounded by persecution, and neither of them with small ranges: the lesson is there for the learning. Again and again these two factors have combined to bring the members of the family into the danger zone: their joint effects are felt by 38 (45%) of the 84 threatened parrots and cockatoos. As in the case of the Glaucous Macaw, habitat loss can mean simply loss of food resource, and obviously it can also simply mean loss of living space; but very often, and perhaps most crucially but least understood, it can mean loss of breeding space, a factor of particular though not peculiar importance to parrots. Persecution likewise takes several forms: birds may be taken for their feathers, or as a good meal, and the two are not mutually exclusive; or for the pet trade (see Relationship with Man).

Total loss of habitat is inevitably a disaster for any organism, and its effects are obvious and predictable to its human witnesses. Deletion from the habitat of a key element on which the organism depends, on which it is in some way specialized, is far less easy to detect until the organism itself shows a response. We are still some distance from understanding the particular vulnerabilities of parrots through their specializations, and for this reason the total number of threatened species may be an underestimate; nevertheless, it is certainly the case that parrots, by virtue of dietary adaptations and breeding requirements, do represent a group within which there is a high degree of specialization, and their overall status is therefore very likely to deteriorate faster than many other groups. The facts that trade is barely monitored at all if it is internal (national), and that it can shift very quickly from one species to another depending on fashion and developing national infrastructures, are further reasons for concern that the total number of threatened species in the family is underestimated. On the other hand, a common though not universal trait is the underestimation of bird population sizes, and there is a growing body of evidence that parrot numbers are very often badly misjudged, so that some species may have been mistakenly listed as at risk. Altogether, then, the assessment of threat status in the family is a difficult and unrewarding endeavour.

Elimination of food resources is blamed for the presumed extinction of Australia's Paradise Parrot (*Psephotus pulcherrimus*): the burning of seeding grass to create green growth for cattle was probably critical among several adverse changes to its environment. Its close relative the Golden-shouldered Parrot is in retreat for the same reasons. In Colombia the near-total clearance of stands of wax palms (*Ceroxylon quindiuense*), ironically the country's national tree, has caused the disappearance of the Yellow-eared Parrot, which not only fed on their fruit but bred in holes in their trunks. What are almost certainly this bird's closest relatives, the Thick-billed and Maroon-fronted Parrots, are similarly specialized on the cones of the many different pines that grow on the Sierra Madre Occidental and Oriental in Mexico. Like the Yellow-eared Parrot, the Thick-bill also depends on its food-trees for nest-sites; the Maroon-front has made itself a little more secure by nesting in cliffs.

The two Mexican parrots are peculiarly vulnerable because their food resource is patchy in both space and time. We now know that the extinction of the Passenger Pigeon, once arguably the most numerous bird in North America, was caused not so much by hunting as by habitat loss (see page 109). The species used to wander over vast areas, in search of patches of masting forest, and would breed opportunistically when it found

The Black-cheeked Lovebird is restricted to a very small area of Zambia, where it now occurs in much reduced numbers. A lowland species, closely associated with mopane woodland, it suffered heavily from trapping in the 1920's. A subsidiary cause of its decline may have been the elimination in the 1950's of the sorghum and millet on which it was a crop pest. Numbers are now thought to be in the nature of 10,000 individuals and the species is currently regarded as Endangered.

[*Agapornis nigrigenis*.
Photo: Dennis Avon/
Ardea]

them. In a scaled-up version of the problem already mentioned (the effect of habitat loss on large frugivores on small islands), the loss of increasing areas of forest made the search for masting areas energetically more expensive and a positive outcome ever less certain; and when there was a simultaneous masting failure in the remaining forest patches, the last of the birds simply starved.

The two Mexican parrots, although rather more seasonally tied, clearly fit the pattern: in a sense they function as gigantic crossbills (*Loxia*), well known for their irruptive behaviour when pine-seed crops fail in the usual parts of their ranges. It was doubtless such a failure that led to the Thick-bill invasions of and temporary residence in southern Arizona around the turn of the century, which have been interpreted as evidence of a former permanent presence in the USA. Now that old-growth pine forest in both sectors of the Sierra Madre has suffered massive clearance, large numbers of Thick-bills are a thing of folklore, and the species is pegged back in the core of its range, further limited by loss of large dead snags in which to nest. Because of their partial nomadism, meaning that they cannot be expected to remain long-term in any one place, it is not inconceivable that a simultaneous pine-seed crop failure could happen and the species disappear without anyone recognizing the fact for several years.

Another parrot which may fit this pattern is the Golden-plumed Parakeet of the Andes, the treatment of which as a threatened species has sometimes been queried. If, however, its nomadic behaviour is related to a particular, though not exclusive, dependence on the cones of *Podocarpus* trees, then again it may be that a temporal bottleneck in food availability could eliminate the species before anyone even notices.

The extent to which this problem afflicts parrots is not known, and it is certainly the case that most parrots seem to be able to switch diets in times of food stress, although whether they obtain sufficient nutrition from foods to which they are less adapted is a matter of conjecture. It is also the case that some birds thought to be relatively strict food specialists, such as Red-spectacled and Vinaceous Amazons (*Amazona vinacea*) on the cones of *Araucaria angustifolia* and the Blue-bellied Parrot on the hearts of the palm *Euterpe edulis*, have proved to be far more generalist than expected; Blue-bellies in fact ignore *Euterpe*! Then again it may prove that there is an important but limited seasonal dependence on a particular food, so that its unavailability through habitat loss can be just as devastating as if the dependence was almost total; and there may yet be cases where almost total dependence exists but has not yet been recognized.

All this uncertainty is a warning to conservationists to exercise the precautionary principle. Unfortunately this must in some cases mean arguing for the retention of habitat for some species in the expectation that the birds might only come to use it once in 20 years. We clearly need to know a great deal more about the food habits of parrots and the fruiting phenology and life cycles of their food plants before being able to make anything more than vague guesses at what the resources are that each species needs to ensure its survival on the planet.

Elimination of nest-sites is, meanwhile, another form of habitat loss which can compromise a parrot's prospects, all the more insidious for often being rather difficult to detect. In Australia the age of *Eucalyptus* trees used by several species of psittacid is surprisingly old at over 500 years, and there is a dawning perception that modern timber-harvesting practices have already compromised the long-term reproductive ability of these species by removing trees in age-classes that are needed now or in the next few hundred years to provide safe homes (see page 267). A similar problem faces Brown-necked Parrots, which use dead *Podocarpus* trees; if regeneration of these plants continues to be prevented by trampling or cutting, the long-term prospects for the species are extremely poor. On Sumba in Indonesia it was recently found that the native parrots nest in the oldest, largest trees available, and that the number of individual parrots in a forest patch was directly correlated with the number of nest-sites it contained.



In the New World the whole question of nest-site availability as a limiting factor in parrot populations is also now recognized as highly relevant. Even the pest-status Monk Parakeet is inhibited from invading converted *pampas* until man-planted eucalypts reach a certain size or until pylons and other tall structures are erected within the open landscape. At the other end of the scale, the best explanation for the confined range of Spix's Macaw is that its reproductive capacity depended on the presence of mature caraiba trees (*Tabebuia caraiba*). These trees formerly stood in large stands along the margins of the River São Francisco and its minor tributaries, but long-term European settlement of the region, coupled with the fact that caraibas grew in places most favoured for maize cultivation and where pasture lasts longest in the dry season, led to their wholesale clearance. Nowadays, just a few creeks retain just a few kilometres of extremely narrow gallery woodland with just a few trees of sufficient age to be of value to the macaw; indeed this may have been the case ever since Spix made his greatest ornithological discovery in April 1819.

In the Pantanal, Hyacinth Macaws are under considerable pressure from lack of nest-sites, as nest-trees have commonly been cleared for the sake of cattle, sometimes because their cavities also play host to vampire bats but for the most part simply in order to open up more ground for pasture. Inevitably a hole-nester will require a large hole and, almost inevitably, a large hole is an adjunct of a large, and therefore old, tree. Hyacinth Macaws, the largest of all the parrots, although capable of nesting in cliffs, clearly cannot survive in open, cliffless landscapes from which the old trees have been eliminated. Very recently one pair has taken to breeding in a nest-box erected in an area where there was a perceived shortage of breeding sites; this is a very welcome development, because to date the common experience with nest-boxes has been that parrots larger than a *Forpus* do not much like them.

Among the first people to discover this aversion were those working to save the amazon parrots of the Antilles, in particular the St Lucia Amazon (*Amazona versicolor*) and Puerto Rican Amazon. Although the great majority of parrots can be induced

By the 1970's the total population of the St Lucia Amazon was estimated to amount to only 100-150 birds: habitat destruction, hunting and hurricane damage had all taken their toll. Measures were then initiated to encourage local awareness and pride in the parrot. It was declared the National Bird, a forest sanctuary was designated to protect the remaining breeding pairs, and guided walks organized to promote interest among natives and tourists alike. The species has benefited so much from all these efforts that the population has now risen to around 300-350 birds.

[*Amazona versicolor*,
St Lucia, Lesser Antilles.
Photo: Michel Gunther/
Bios]



The New Zealand flightless Kakapo, the heaviest and most curious of all the parrots, has long been the hapless victim of man. Exploited first as an abundant source of food, it then fell easy prey to the animal predators introduced in the nineteenth century. Now extinct throughout its natural range, it survives precariously on three tiny offshore islands, having been translocated there by the New Zealand Wildlife Service within the last decade. The Kakapo's complicated lek mating system and complete lack of breeding activities some years offer no hope for a rapid increase in numbers. By 1997 the total population was still only 50 birds. The one encouraging sign is the hatching of four chicks in early 1997, the first breeding success recorded since 1993.

[*Strigops habroptilus*, Maud Island, New Zealand. Photo: Gérald Cubitt/WWF/Bios]

to breed in captivity using artificial boxes prepared by the breeder, nest-boxes set out in the wild have held no attraction, even when all wild alternatives appear to have been taken. In frustration at the indifference of the Puerto Rican birds to their boxes, the recovery team elected instead to enhance existing potential nest-sites within the species's last forest site, Luquillo, scooping holes to greater depths, drilling drainage channels, using chicken wire to fit false bottoms, and visoring entrances with zinc sheeting, and after 1976 all sites used were ones that had been improved by human intervention. That nest-site availability was a real constraint was finally proven after the devastation of Hurricane Hugo in September 1989: what was certainly a catastrophe at one level for the species, with 47 birds before the strike being reduced to 21 after it, proved ultimately to have been a blessing for, by destroying so much it caused the forest to react by fruiting more, in a competition to fill the gaps, and by tearing off so many limbs from the larger trees, it created a new generation of natural nest-cavities in the forest. Breeding success in the 1990's has consequently been encouraging, and the species has started to recover its numbers.

It is the conservation effort on behalf of the Puerto Rican Amazon that has taught the world the most about the management of small parrot populations and the nature of the problems such populations face. To begin with, of course, it was habitat destruction that reduced the population to low numbers

and ultimately to a single location. Hunting and pet-taking had concurrent effects but, by the time the small area of remaining habitat had been secured in the late 1960's, these factors began to amplify the danger. The colonization of Puerto Rico by the Pearly-eyed Thrasher (*Margarops fuscatus*), doubtless in part facilitated by the forest clearance that had already disadvantaged the parrot, brought a new problem: these birds, themselves constrained by suitable breeding sites, attack eggs and young of parrots in nest-cavities. At the time thrasher numbers were building up in Luquillo, so were those of the parasitic bot- or warble-fly *Philornis pici*, almost certainly because it favours thrashers as hosts: inevitably, however, other hole-nesting species suffered from this shift, and none more so than the parrot, with 25% of its young experiencing infestation in the period 1973–1979. As if this was not enough, introduced honeybees (*Apis mellifera*) had by then become common in Luquillo, and in the same time-frame took over at least five parrot nests in the post-breeding period; at various stages, too, local people cut trees with bee nests in them to get at the honey, once again making the parrot the greatest loser. It was once feared that black rats (*Rattus rattus*) were a major nest predator and, although there is no proof of this, prophylactic action is constantly taken to reduce their possible impact on the parrots. Indeed, it is worth noting that nest watches over a 17-year period, 1973–1989, resulted in at least 20 nests fledging young where,

without human intervention, they would have failed. Escaped monkeys may fairly easily reach and colonize the forest, bringing further risks not only of nest predation but food competition. Other species of parrot are free on Puerto Rico and likewise represent a potential threat in terms of nest and food competition and through the transmission of disease.

Stochastic events assume great potential and significance when a population descends below a certain level. For the Puerto Rican Amazon the danger from hurricanes is particularly serious, and although all Caribbean parrots must very largely be "hurricane-adapted", as exemplified by one Imperial Amazon (*Amazona imperialis*) that survived 13 days without food before fully recovering, and although in 1989 it turned out that Hugo also had a beneficial effect, as outlined above, once a species is tightly confined to an area it is totally at the mercy of chance events. On Puerto Rico, hurricanes are blamed for the annihilation of the Culebra subspecies *gracilipes* in 1899 and the Río Abajo population of the nominate form in 1928. In 1967 a major drought coincided with the period of maximum rate of decline of the species. The collapse of nest-trees during breeding attempts has occurred twice since 1954, and predation by Red-tailed Hawks (*Buteo jamaicensis*) can be significant, at least on subadults, for at least two out of five radio-tracked birds were killed by hawks at 4 and 163 days after fledging; it would take one wintering Peregrine keying in on Amazon foraging flights for the entire population to disappear in a season.

It is these kinds of event that seem likely to lie behind apparent fluctuations in numbers of *Vini* lorikeets on their often tiny islands. Time and again one encounters contradictory reports of the rarity or abundance of a species on an island visited at different times by observers. For example, in 1984 some 200 Blue Lorikeets were estimated present on Aitutaki, in 1991 under 1000, and in 1994 about 1200, and while some of this may be attributable to chance and observer competence, there is no reason why populations should not fluctuate with conditions: apart from droughts and cyclones, phenomena like good and

bad flowering years may have profound effects on population levels. Clearly in such highly constrained circumstances, when a population is on a naturally induced downward trend, it only takes one small man-related development to make that trend irreversible.

Another example of a parrot in an extinction vortex is the Mauritius Parakeet. On Reunion its close relative *Psittacula eques*, almost certainly conspecific, disappeared probably as the result of intense long-term hunting pressure. On Mauritius the main problem was habitat loss, compounded initially by hunting but long outlasting this factor: the World Bank's funding for clearance of upland dwarf forest on Plaine Champagne in 1971–1974 caused the already tiny population of 58 to plummet to below 10 by 1980. Meanwhile, nest predation by the area's 4000-odd introduced crab-eating macaques (*Macaca fascicularis*) was blamed for depressed breeding success, as was nest-site competition from introduced Rose-ringed Parakeets and Common Mynas (*Acridotheres tristis*). Later the monkeys were absolved of nest predation but implicated in food competition, along with black rats. Once again severe weather is believed to have played a part, with one major cyclone in 1975 halving the number of nest-trees, and one in 1979 apparently reducing the number of birds. Food shortages at the end of winter, owing not merely to the season but to the degraded state of natural forest on Mauritius and competition from other sources, were feared to be causing a temporal bottleneck through which only the fittest birds could pass. Moreover, the cyclones themselves strip food from trees, and with no forest left elsewhere the option to forage in other parts of the island as in former times no longer exists; and of course wind damage to forest opens it up for the invasive plants and animals that can more quickly degrade it and outcompete its native fauna.

The same kind of story emerges from New Zealand, where the Kaka is fighting a rearguard action against exotic invaders. Here, more detailed scientific study has uncovered a depressingly intractable problem. Kakas greatly exploit honeydew, a

From the almost total lack of information concerning both its feeding habits and breeding behaviour, the Red-browed Amazon appears to have attracted scant attention from scientists and observers alike. An inhabitant of humid lowland forests in coastal areas of Brazil, it has suffered from the massive deforestation carried out there in recent years and has vanished completely from some parts of its former range. Distribution is now very local, and the species is still subject to trapping. Though present in various reserves and national parks, its continuing survival is far from secure and it is currently listed as an Endangered species.

[*Amazona rhodocorytha*, southern Bahia, Brazil.
Photo: Luiz Claudio Marigo]



high-energy food, in summer and autumn, and it appears that they depend on it to bring them into breeding condition the following spring. Outcompetition for this resource by introduced and plainly uncontrollable wasps and possums appears to be directly related to the Kaka's critically low reproductive output; hence a crash in the parrot's numbers can be safely predicted in the next few decades.

In due course the Kaka may become as challenging and problematic for conservation as its near namesake, the Kakapo. This flightless nocturnal lekking wonder, the heaviest of all parrots, evolved like the Dodo (*Raphus cucullatus*) in the absence of mammalian predators, including man. Once, however, stoats (*Mustela ermina*), black rats and cats had escaped into its range on the main islands of New Zealand its fate there was sealed. Eventually, the only option biologists could take was to translocate birds to offshore islands free of these predators. However, if defencelessness against mammalian predators was one result of long isolation and probably of intraspecific competition, extreme K-selection in the form of life so long that reproductive efforts may be deferred for years, was another. Just as the Kaka needs its honeydew, the Kakapo needs a major masting event of podocarps in order to trigger breeding activity. By providing supplementary food biologists have to some extent overcome this problem, but with the added complication of the lekking system, the existence at one stage of only two females (it is typical of lekking species that there should be a high male:female ratio), and a naturally low output even in optimal conditions, the opportunities to increase the species's numbers have been very limited.

Exotic invaders can even include conspecifics. On the island of Sangihe north of Sulawesi, the nominate race *histrion* of the Red-and-blue Lory has been reduced by trade to perhaps 30 birds, but so many birds of the race *talautensis* have now passed through the island that several have escaped and appear to be commingling with the nominate form. On Cebu in 1996 there was an attempt, fortunately thwarted, to intro-

duce another race of the Philippine Hanging-parrot by people unaware that the highly distinctive indigenous form *chrysonotus* had just been confirmed as surviving in the island's last forest patch. At its most extreme the problem may not even be exotic or invasive: the very last wild Spix's Macaw, a male, formed an attachment with a Blue-winged Macaw, and when a female Spix's was released its prior attachment clearly prejudiced the situation, and before a decision on the appropriate management could be taken the released bird disappeared, taking with her, perhaps, the last real chance for this exceptionally beautiful animal.

However, Spix's Macaw breeds in captivity, and there is now a consortium of holders, run by the Brazilian conservation authority IBAMA, that is attempting to maximize the reproductive output of the 30–40 individuals they manage. Regrettably, most of these birds are related to each other, and the majority may be the offspring of one pair, so problems of inbreeding may be encountered in due course. Of greater ultimate significance, however, is whether captive breeding can really further the interests of species that rely so heavily on learning and handed-down tradition in relation to their environment. Macaws take years to discover the secrets of their environment, and it seems improbable that captive-bred individuals of a species extinct in the wild could easily, and in some cases ever, pick up the information they need from scratch. At any rate, when wild-caught Thick-billed Parrots (which are modified macaws), including one bird that had lived 30 years behind the bars of its cage, were turned loose in southern Arizona, they all immediately knew what to do, how to handle food, how to respond to each others' signals, how to avoid predators; but when expensively captive-bred birds of the same species were liberated into the same area, they failed to recognize food, or alarm calls, or predators, and within days they were all either dead or back in their cages.

For certain species, such as Tasmania's Orange-bellied Parrot, captive breeding may yet prove valuable, particularly those



The Indigo Macaw takes its scientific name from Edward Lear, better known for his nonsense rhymes than for his life's work, painting birds. Long known only from traded birds, it remained a mystery until it was rediscovered in Brazil in 1978. It now survives only in a small area of caatinga vegetation dotted with stands of licuri palms, on which it relies for nuts. Even though the species may never have been very widespread, the gradual clearance of these palms over recent years has drastically reduced its range. The limited amount of suitable habitat and continued illegal trapping compromise the survival of this very striking bird.

[*Anodorhynchus leari*,
Raso da Catarina, Bahia,
Brazil.
Photo: Luiz Claudio Marigo]

All but two of the hanging-parrots are confined to island territories of greatly varying sizes. The Sula Hanging-parrot inhabits only the Sula and Banggai Islands, very small archipelagos in the western Moluccas. Within these islands it appears to be quite common, so it must continue to find sufficient primary and secondary forest where it can still feed and breed satisfactorily. In the absence of any evidence of hunting or trapping of the species, it appears to be an example of a parrot which can continue to live successfully within a very confined area, provided it and its habitat are left in peace.

[*Loriculus sclateri*, Taliabu, Sula Islands, Indonesia.

Photo: N. J. Bean/Aquila]



with less specialist needs which can be raised by their parents, socialized in an aviary without inappropriate imprinting, and let loose amidst wild birds. Even so, there remains the spectre of disease transmission from caged to wild birds, since the former are likely to have been in touch with any number of other species, and parrots are notorious bearers of infection (psittacosis, a viral disease that can be transmitted to humans, was originally found to afflict parrots, although it is now known to affect several other bird groups too). There also remains the question of whether the causes of original loss from the area have been adequately addressed: often enough, captive breeding is embarked on without consideration of this vital issue. Altogether, therefore, captive breeding is not a management technique to pursue unless circumstances present no choice.

Translocation, such as has been practised with the Kakapo and some of the *Vini* lorikeets of the Pacific, has the virtue of relative simplicity, cutting out the middle stage of captive breeding, although in fact the Kakapo is also being husbanded in zoos; it is used basically to lift populations out of the path of exotic predators. It might just be applied in continental situations where exploitation had caused local extinction, but the homing instincts of many species may then be counterproductive. Apart from this, the constraint on the technique is clearly that there must be somewhere secure to which birds can be taken without prejudice to existing wildlife, and outside of fairly depauperate islands the opportunities for this are small.

The lesson of all these extreme cases is the importance of not allowing cases to become extreme: the best way to look after a species is to give it enough space and strength to look after itself. This inevitably means attempting to ensure that there is sufficient habitat, both for breeding and for feeding, sufficient control of exploitation, in terms of hunting as well as trade, and sufficient protection from exotic predators and competitors to ensure that each species remains in balance with its environment. BirdLife's development of the concept of the EBA, explained above, of which there are over 220 on the planet, was in one respect an attempt simply to determine the prime geographical targets for cases not yet extreme but likely to become so in the fairly near future. With 36% of all parrot species confined to EBA's and many others (the precise number is not known) occurring within them, the importance of establishing large, secure

protected areas in representative parts of these centres of endemism is obvious.

However, security depends on local and national goodwill, and in hard-pressed economies this is only likely to be achieved through the kind of pride-building awareness campaigns spearheaded by P. J. Butler in the Caribbean, and through the inclusion of parrot-watching activities in the general packages of attractions offered to internal and international tourists, both of whom represent important sources of income. Countries that happen to possess macaws and clay-licks are at a particular advantage here, but parrots are wonderful advertisements for wilderness and diversity wherever they occur, and are among the most easily marketable of animals in the service of nature conservation. In this regard they probably have a stronger role to play than any other bird family: the sooner they get to play it the better.

General Bibliography

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Subfamily LORIINAE

Genus *CHALCOPSITTA* Bonaparte, 1850

1. Black Lory

Chalcopsitta atra

French: Lori noir **German:** Schwarzlori **Spanish:** Lori Negro
Other common names: Rajah Lory

Taxonomy. *Psittacus ater* Scopoli, 1786. New Guinea.

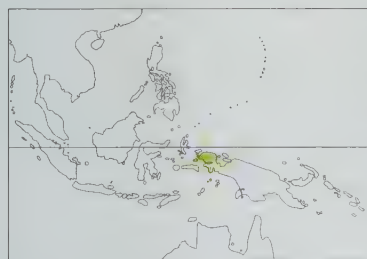
Forms a superspecies with *C. duivenbodei*. Occasionally included in *C. scintillata*. Race *insignis* may be an incipient species. Possible race *spectabilis* known by the type from Mamberik Peninsula, NW New Guinea; this form is close to race *insignis* but may be a hybrid with *C. scintillata*. Three subspecies currently recognized.

Subspecies and Distribution.

C. a. bernsteini Rosenberg, 1861 - Misool I.

C. a. atra (Scopoli, 1786) - Batanta I, Salawati I and W Vogelkop (Irian Jaya).

C. a. insignis Oustalet, 1878 - E Vogelkop, Amberpon I and Onin and Bomberai Peninsulas, Irian Jaya.



Descriptive notes. 32 cm; 260 g. Glossy purplish black, with bare orbital skin and skin at base of bill black; rump blackish blue; underside of tail olive yellow, basally red. Immature has bare skin on face whitish. Race *bernsteini* has reddish purple markings on forehead and thighs, paler rump; *insignis* has forehead, area around bill, leading edge of wings, underwing-coverts and thighs red; head streaked grey-blue, rump dull blue.

Habitat. Open habitats including coastal plantations, grassy savanna and forest edge; also mangroves, *Nypa* palm forest, freshwater swamp and dryland forest; even very open,

stunted forest on limestone.

Food and Feeding. Seen feeding at flowering *Schefflera* shrubs.

Breeding. Male in breeding condition in Dec. In captivity: 2 eggs; incubation lasting c. 25 days; nestling period c. 75 days.

Movements. No information, but occurrence in large flocks and use of open habitats, which may exhibit pronounced seasonal regimes, suggest some local displacements may occur.

Status and Conservation. Not globally threatened. CITES II. A BirdLife "restricted-range" species. Locally common, often in large flocks, but a better understanding of each race's populations needed. International trade was moderately high in late 1980's, with 2808 exported in the four years 1987-1990; commercial importation into the EC from Indonesia was banned in Sept 1991.

Bibliography. Andrew (1992), Anon. (1993), Beehler *et al.* (1986), Harrison & Holyoak (1970), Lint (1969), Low (1978, 1993c), Rand & Gilliard (1967), Ripley (1964), Sayers (1974a, 1974b), Sujatnika *et al.* (1995), Sweeney (1997c).

2. Brown Lory

Chalcopsitta duivenbodei

French: Lori de Duyvenbode **German:** Braunlori **Spanish:** Lori Pardo
Other common names: Duyvenbode's Lory

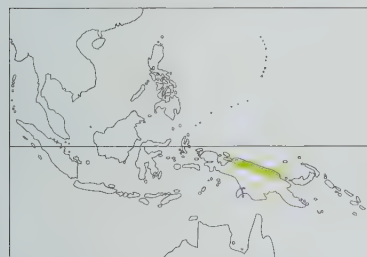
Taxonomy. *Chalcopsittacus Duivenbodei* Dubois, 1884. New Guinea = Tana Mera.

Forms a superspecies with *C. atra*. Two subspecies recognized.

Subspecies and Distribution.

C. d. duivenbodei (Dubois, 1884) - NW New Guinea E into W Papua New Guinea.

C. d. syringanuchalis (Neumann, 1915) - NE New Guinea.



Descriptive notes. 31 cm. Generally warm mid-brown; bill, skin around bill, and bare orbital ring black; forehead and feathers around bill yellow, shading to mid-brown, with narrow yellow streaks on sides of neck and nape; breast faintly scalloped yellow; bend of wing yellow; underwing-coverts and thighs orange-yellow; rump violet; outer tail feathers with some yellow; legs dark grey. Female usually lacks yellow in tail. Immature duller, with less yellow. Race *syringanuchalis* darker on head and back.

Habitat. Primary lowland and tall secondary forest, up to 200 m; sometimes seen along for-

est edge.

Food and Feeding. No information available.

Breeding. Apr. In captivity: 2 eggs; incubation lasted 24 days; nestling period around 11 weeks.

Movements. No information.

Status and Conservation. Not globally threatened. CITES II. A BirdLife "restricted-range" species. Apparently irregular in numbers, common in some places and rare in others within range.

Bibliography. Andrew (1992), Auber (1934), Beehler *et al.* (1986), Berggy (1978), Coates (1985), Courtney (1997b), Dolton (1991), Greensmith (1975), Low (1984), Pearson (1975b), Rand (1942b), Rand & Gilliard (1967), Ripley (1964), Robiller & Trogisch (1983b), Sujatnika *et al.* (1995).

3. Yellow-streaked Lory

Chalcopsitta scintillata

French: Lori flamméché **German:** Schimmerlori **Spanish:** Lori Chispeado

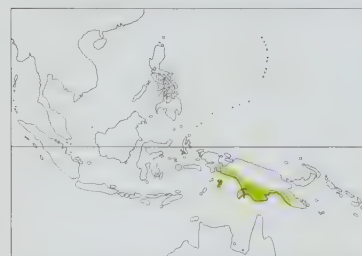
Taxonomy. *Psittacus sintillatus* [sic] Temminck, 1835. Lobo Bay, New Guinea. Species name emended to *scintillatus* in 1839. Three subspecies recognized.

Subspecies and Distribution.

C. s. rubrifrons G. R. Gray, 1858 - Aru Is.

C. s. scintillata (Temminck, 1835) - S New Guinea from Triton Bay (Irian Jaya) E to R Fly.

C. s. chloroptera (Salvadori, 1876) - R Fly E to SE Papua New Guinea.



Descriptive notes. 31 cm; 180-245 g. Generally green; bill, skin at base of bill and bare orbital skin black; lores, forehead to mid-crown red, bordered blackish in indistinct patch from base of lower mandible through ear-coverts to hindcrown, shading in turn to green streaking; irregular red spots and patches on throat and breast; yellow or orange streaks on mantle, breast and belly; thighs red; underwing-coverts red; yellow band across underside of flight-feathers; underside of tail light greenish brown, basally red; legs dark grey. Immature has reduced red on head. Race *chloroptera* has mostly green underwing-coverts; *rubrifrons* has wider, more orange streaking on breast.

Habitat. Lowland savanna and forest, disturbed lower montane forest, secondary growth, sago swamps and mangroves, and coconut plantations, up to 800 m.

Food and Feeding. Nectar or pollen of *Syzygium* (without damaging flowers), nectar of *Brassia actinophylla*, sago palms and *Schefflera*.

Breeding. Apr and Sept; well-grown fledglings in Feb; male with partly developed gonads in Jul. Nest recorded in hollow 24 m up in tree.

Movements. No information, but given occupation of savanna, and occurrence in flocks, there may be some seasonal movements; certainly local abundance seems to be influenced by periodic blooming of certain trees.

Status and Conservation. Not globally threatened. CITES II. Common, often in flocks of up to 30; at one site in SE New Guinea density estimated at 20 birds/km².

Bibliography. Andrew (1992), Beehler *et al.* (1986), Bell (1982), Burrows (1993), Coates (1985), Courtney (1997b), Diamond (1972a), Gregory (1995a, 1995b), Harrison & Holyoak (1970), Hicks (1992), Kyme (1979), Mackay (1970, 1971), Mayr & Rand (1937), Mees (1982a), Rand (1942a), Rand & Gilliard (1967), Tubb (1945).

4. Cardinal Lory

Chalcopsitta cardinalis

French: Lori cardinal **German:** Kardinallori **Spanish:** Lori Cardenal

Taxonomy. *Lorius cardinalis* G. R. Gray, 1849. Solomon Islands. Monotypic.

Distribution. Islands E of New Ireland S through Solomons.



Descriptive notes. 30-31 cm; 173-215 g. Bright red, darker on back and wings; bill reddish orange, dark at base; bare orbital skin dark; underparts lightly edged yellowish, giving vaguely scalloped appearance; legs grey. Immature paler on back and wings, bill dull orange.

Habitat. Mangroves, lowland forest, secondary growth, coconut groves, wherever trees are flowering, lowlands to 1200 m (830 m on Bougainville).

Food and Feeding. Blossoms of *Cocos nucifera* in gardens and of *Elaeocarpus* and *Syzygium* in primary forest, seemingly preferring food trees with red flowers; also small berries.

Breeding. Copulation in Aug. and display in Sept. Only nest reported, Aug, was in hollow, metre-long, near-vertical branch stump near base of 10 m high ridgetop tree, in primary forest at 1150 m, on Kolombangara.

Movements. Birds readily move between islands to feed and roost.

Status and Conservation. Not globally threatened. CITES II. A BirdLife "restricted-range" species. Abundant on Kolombangara, Ghizo, New Georgia, Guadalcanal, Isabel, Bougainville; commonest in coconut plantations and other lowland disturbed sites, less so in lowland and hill forest.

Bibliography. Blaber (1990), Buckell (1996a), Buckingham *et al.* (1995), Cain & Galbraith (1956), Coates (1985), Diamond (1975a), Greensmith (1975), Hadden (1981), Mayr (1945b), Schodde (1977), Sibley (1951), Sweeney (1994c), Virtue (1947), Webb (1992, 1997).

Genus *EOS* Wagler, 1832

5. Red-and-blue Lory

Eos histrio

French: Lori arlequin **German:** Harlekinlori **Spanish:** Lori de las Sangihe
Other common names: Blue-tailed Lory

Taxonomy. *Psittacus histrio* P. L. S. Müller, 1776, Sangihe Islands.
All six *Eos* species comprise a superspecies. Three subspecies recognized.

Subspecies and Distribution.

E. h. challengerii Salvadori, 1891 - Miangas I, N of Sulawesi.
E. h. talautensis A. B. Meyer & Wigglesworth, 1894 - Talaud Is.
E. h. histrio (P. L. S. Müller, 1776) - Sangihe I, Siau I and Ruang I.



Descriptive notes. 31 cm. Red, with orange bill and purplish blue patch on mid- to hindcrown and broad line from around eye down side of neck to mantle; breastband, mantle and back purplish blue; scapulars, flight-feathers and thighs black; wing-coverts tipped black; tail reddish purple above; legs grey. Immature has more blue on crown. Race *talautensis* has less black on wing-coverts and flight-feathers; *challengerii* smaller, with narrower breastband, while line from eye does not meet mantle.

Habitat. Forest and edge, visiting coconut plantations and other open areas to feed.

Food and Feeding. Seen feeding in coconut, *Ficus* and *Canarium* trees.

Breeding. Main period, Talaud, Apr-May, but also Nov-Dec; latter is reportedly main period on Sangihe. Nest in hole in large tree (once a *Canarium*) in both forest and cultivated areas. Eggs usually 2.

Movements. Local people report an influx of up to 150 birds each year on Salebabu, Nov-Mar.

Status and Conservation. ENDANGERED. CITES I (since Feb 1995). A BirdLife "restricted-range" species. Last century uncommon and mainly in hills, Sangihe, but common near the coast on Talaud (presumably the main island, Karakelong); in 1978 the status on both islands was much the same; total population of Talaud was thought to be c. 2000 birds in early 1990's, but survey work in 1995 suggested higher numbers. Owing to extensive habitat loss and trade exploitation, the Sangihe population may be only 30-100 birds, amongst which escapes of the Talaud race now mix; the tiny, deforested Siau and Ruang cannot now hold viable populations. Of the three Talaud islands, the species is extinct on Kabaruang, small numbers survive on Salebabu, while on Karakelong it is still common in the N (communal roost of 400 observed, and another of 500 reported), less so in the S. However, intensive trapping, no longer possible in Sangihe, continues on Karakelong, with as many as 700 birds being taken in 1992/93, and 390-440 in 1994; the majority of these birds appear to have been smuggled to Singapore. Nothing is known of the status of the race *challengerii*, but the population cannot be large and may even be extinct.

Bibliography. Andrew (1992), Barnicoat (1995b), Barnicoat & Laubscher (1995), Bishop (1992), Coates & Bishop (1997), Collar & Andrew (1988), Collar *et al.* (1994), Holmes (1995b), Nash (1993), van Oosten & Riley (1996), Riley (1995, 1996, 1997), Sujatnika & Jepson (1995), Sujatnika *et al.* (1995), Sweeney (1993a, 1995d, 1995g), Wheatley (1996), White & Bruce (1986).

6. Violet-necked Lory

Eos squamata

French: Lori écaillé

German: Kapuzenlory

Spanish: Lori Escamoso

Other common names: Moluccan Red Lory(!)

Taxonomy. *Psittacus Squamatus* Boddaert, 1783, Gebe.

All six *Eos* species comprise a superspecies. Proposed race *atrocaerulea* doubtfully valid, as based on juvenile birds; *insularis* is synonym of *riciniata*. Three subspecies recognized.

Subspecies and Distribution.

E. s. riciniata (Bechstein, 1811) - N Moluccas, including Widi Is.
E. s. obiensis Rothschild, 1899 - Obi and Bisa in NC Moluccas.
E. s. squamata (Boddaert, 1783) - W Papuan Is and nearby Schildpad Is.



Descriptive notes. 27 cm. Red; bill orange; collar violet-blue, broad in some birds, absent in others; belly to undertail-coverts dark purplish blue; scapulars purple tipped black; greater wing-coverts and flight-feathers edged black; tail purple-red above, brownish red below; legs grey. Immature has underparts red with purplish edging. Race *riciniata* has violet collar usually extending from breast up onto hindcrown, red scapulars; *obiensis* has black scapulars.

Habitat. Lowland forest and forest edge, mangroves, disturbed forest and scrubby secondary growth adjacent to cultivation, coconut plantations; also montane primary forest up to 1220 m.

Food and Feeding. Flowering sago palm *Metroxylon*, unripe figs (*Ficus*), nectar of *Erythrina* flowers.
Breeding. No information from wild. In captivity: 2 eggs; incubation c. 27 days; nestling period c. 80 days.

Movements. Daily movements between main islands and small offshore islets noted; also noted to form large flocks, a habit which can make it common in one area and rare in another, suggesting some form of larger-scale nomadism.

Status and Conservation. Not globally threatened. CITES II. A BirdLife "restricted-range" species. A range of 70,700-435,080 birds was estimated for the population of the N Moluccas, but survey work in 1990's gave figures of 115,400-283,700 for proposed Lalobata reserve (Halmahera) alone; around 2980 birds are estimated to have been trapped in 1991, suggesting that trade pressure is not excessively high, but it has been recommended that a biologically safe rate of annual offtake should be established.

Bibliography. Andrew (1992), Anon. (1993), Bechler *et al.* (1986), Bertagnolio (1973), Bishop (1992), Bräutigam & Humphreys (1992), Coates & Bishop (1997), Cooke (1990, 1995b), Hartert (1903a), Inskipp *et al.* (1996), Lambert (1993a, 1993c), Lambert & Young (1989), Linsley (1995), MacKinnon *et al.* (1995), Mees (1965), Milton (1988), Rand & Gilliard (1967), Ripley (1964), Smiet (1985), Sujatnika *et al.* (1995), White & Bruce (1986), Wright (1977).

7. Red Lory

Eos bornea

French: Lori écarlate

German: Rotlory

Spanish: Lori Rojo

Other common names: Moluccan/Moluccan Red(!)/Buru Lory

Taxonomy. *Psittacus borneus* Linnaeus, 1758, Borneo, India: error = Ambon.

All six *Eos* species comprise a superspecies. Various populations have been awarded separate races, on basis of purported size differences; however variability within these populations, or evidence of clines, suggests size cannot be used as a subspecific character. "*E. goodfellowi*" seems likely to represent immature of present species introduced to Obi. Proposed races *bernsteini* and *rothschildi* invalid, as variation is clinal. Two subspecies recognized.

Subspecies and Distribution.

E. b. cyanothorus (Vieillot, 1818) - Buru.

E. b. bornea (Linnaeus, 1758) - Ambon, Haruku, Saparua, Seram Laut, Watubela, Tayandu and Kai Is.



Descriptive notes. 31 cm. Red; bill orange to orange-yellow; bare orbital ring dark grey; secondary coverts and secondaries tipped black; primaries black with red speculum; lower tertials and undertail-coverts blue; tail dull red; legs dark grey. Immature duller, with less blue. Race *cyanothorus* darker.

Habitat. Lowland forest, mangroves, secondary forest and coconut plantations, chiefly in coastal areas, but up to 900 m on Seram and up to 1800 m on Buru.

Food and Feeding. Birds have been seen feeding in flowering *Eugenia* and *Erythrina* trees; remains of small insects found in stomachs.

Breeding. Nest-site prospection noted Aug-Sept; nestlings, Dec. Nest in hollow high in old tree. Nestling period in captivity 7-9 weeks.

Movements. Small groups frequently cross between islands in the Kai group. Seasonal fluctuations on Ambon have been claimed, with highest numbers Apr-Jul, but recent evidence does not support this idea.

Status and Conservation. Not globally threatened. CITES II. A BirdLife "restricted-range" species. Common to abundant, often in flocks up to 30. However, also heavily traded; international trade, 1985-1990, averaged 6538 birds per year, the USA being the main importer, and a general trend of declining exports may suggest declining numbers in the wild, a possibility which needs investigation. Certainly now scarce on Ambon and in Kai Is, and in Seram only common in remote areas; the commonest parrot on Buru, late 1989.

Bibliography. Andrew (1992), Anon. (1993), Auber (1938), Bowler & Taylor (1989), Buckell (1993), Coates & Bishop (1997), Courtney (1997b), Edwards & Nash (1992), Edworthy (1968), Holyoak (1970b, 1976), Inskipp *et al.* (1996), Jepson (1993), Marsden *et al.* (1997), Poulsen & Jepson (1996), Schodde & Mathews (1977), Siebers (1930), Smiet (1985), Stresemann (1914), Sujatnika *et al.* (1995), Walters (1975), Wheatley (1996), White & Bruce (1986).

8. Blue-streaked Lory

Eos reticulata

French: Lori réticulé

German: Strichellori

Spanish: Lori de las Tanimbar

Taxonomy. *Psittacus reticulatus* S. Müller, 1841, Moluccas.

All six *Eos* species comprise a superspecies. Monotypic.

Distribution. Tanimbar Is. Probably introduced to Kai Is and Damar, and apparently also Babar.



Descriptive notes. 31 cm. Similar to *E. cyanogenia* but broad blue stripe back from eye joins blue-streaked mantle; wing-coverts are red heavily edged black, primaries almost all black; thighs and flanks red. Immature has underparts edged blue-black, bill brownish.

Habitat. Primary forest inland, but apparently commoner in coastal secondary forest, plantations and mangroves.

Food and Feeding. No information; visits coconut plantations and sago palms.

Breeding. No information from wild. In captivity: 2 eggs; nestling period lasting as long as 12 weeks.

Movements. No information.

Status and Conservation. Not globally threatened. CITES II. Currently considered near-threatened. A BirdLife "restricted-range" species. Locally abundant, especially along coast, but trapping for the cagebird trade is heavy, with some habitat destruction. In the years 1983-1989 recorded international trade averaged 3198 birds annually, resulting in pressure to include the species on CITES I, but fieldwork in 1993 on Yamdena, which represents c. 55% of the species's range, revealed an estimated 220,000 ± 52,000 birds, and past catch-rates of less than 2% were judged unlikely to have caused any decline.

Bibliography. Andrew (1992), Cahyadi, Jepson & Manoppo (1994), Coates & Bishop (1997), Collar & Andrew (1994), Collar *et al.* (1994), Finsch (1900), Inskipp & Corrigan (1992), Lever (1987), McGregor (1991), Riley (1974), Smiet (1985), Sujatnika *et al.* (1995), Sweeney (1992), Wheatley (1996), White & Bruce (1986).

9. Black-winged Lory

Eos cyanogenia

French: Lori à joues bleues

German: Schwarzschulterlory

Spanish: Lori Alinegro

Other common names: Biak Red Lory

Taxonomy. *Eos cyanogenia* Bonaparte, 1850, Numfor.

All six *Eos* species comprise a superspecies. Monotypic.

Distribution. Islands of Biak-Supiori, Numfor, Manim and Meos Num in Geelvink Bay, NW New Guinea.

Descriptive notes. 30 cm; 120 g. Generally red; bill orange; purplish blue patch around eye extending through ear-coverts to sides of neck; upperwing-coverts, scapulars and back black; secondaries and primaries tipped black; thighs and flank spot black; tail black, outer feathers red on inner vanes, hence appears largely red below. Immature has purplish edges to body feathers.

Habitat. Birds feed in inland forest up to 460 m and roost in coconut plantations and coastal forest.

Food and Feeding. Recorded feeding in flowering trees.



Breeding. Courtship and nest prospecting observed Jun-Jul. In captivity: 2 eggs; incubation lasting 26 days; nestling period 75-87 days.

Movements. Birds are reported to be highly nomadic, but this is perhaps on a short-term basis without seasonal influence.

Status and Conservation. **VULNERABLE.** CITES II. A BirdLife "restricted-range" species. Status on Numfor and Manim unknown but likely to be very poor owing to the almost total clearance there of primary forest. Generally uncommon on Biak, though common on adjacent Supiori; at risk on former through

habitat loss and trade. International trade may be a serious threat: Indonesian records indicate 632, 1370 and 1370 birds exported, 1988-1990. Commercial importation into EC from Indonesia has been prohibited since Dec 1989.

Bibliography. Andrew (1992), Anon. (1993), Arndt (1992a), Beehler *et al.* (1986), Bishop (1982), Collar & Andrew (1988), Collar *et al.* (1994), Edwards & Nash (1992), Mayr & Meyer de Schauensee (1939a), Rand & Gilliard (1967), Sujatnika *et al.* (1995), Wright (1977).

10. Blue-eared Lory

Eos semilarvata

French: Lori masqué

German: Halbmaskenlory

Spanish: Lori de Seram

Other common names: Seram Lory

Taxonomy. *Eos semilarvata* Bonaparte, 1850, mountains of Seram.

All six *Eos* species comprise a superspecies. Monotypic.

Distribution. Mountains of Seram (Moluccas).



Descriptive notes. 24 cm. Red; bill orange; area from base of bill under eye and onto ear-coverts violet-blue; belly to undertail-coverts violet-blue; primaries black with a red speculum; secondaries tipped black; tertials tinged blue; tail reddish brown above; legs grey. Immature duller, with much less blue.

Habitat. Forest in mountains, above 1200 m; ranges out of forest up into tree heathers, occasionally down to 800 m.

Food and Feeding. Nectar, taking tree heather at highest altitudes.

Breeding. No information available.

Movements. No information; possibly some

altitudinal shifts occur seasonally.

Status and Conservation. Not globally threatened. CITES II. Currently considered near-threatened. A BirdLife "restricted-range" species. Reported to be common to locally abundant, with little current threat from logging, but species is now being trapped, and could also suffer from fires within its very limited altitudinal range; careful monitoring required, along with research to establish ecological requirements.

Bibliography. Andrew (1992), Bowler & Taylor (1989), Coates & Bishop (1997), Collar *et al.* (1994), Sujatnika *et al.* (1995), Walker & Reynolds (1983), Wheatley (1996), White & Bruce (1986).

Genus PSEUDEOS: J. L. Peters, 1935

11. Dusky Lory

Pseudeos fuscata

French: Lori sombre

German: Weißbüzzellori

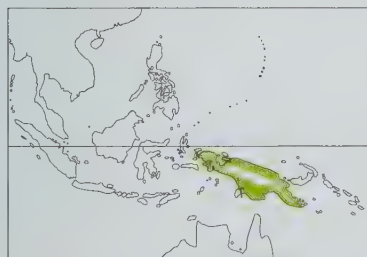
Spanish: Lori Sombrio

Other common names: White-rumped/Dusky-orange Lory

Taxonomy. *Eos fuscata* Blyth, 1858, Manokwari (formerly Dorey), New Guinea.

In past considered polytypic, with nominate race confined to birds of Salawati and nearby mainland, and all other populations grouped in race *incondita*. Monotypic.

Distribution. New Guinea throughout, except for highest areas; also islands of Yapen and Salawati.



Descriptive notes. 25 cm; 117-192 g. Variable, with yellow and orange morphs. Generally dusky brown, with feathers of cheeks, hindneck and upper breast edged yellow; bill orange with naked orange skin around lower mandible; mid-crown, full ring around neck, breastband and central area of belly softly defined yellow, with yellow wing-edge, lower thighs and staining in central tail feathers; lower back and rump creamy to white, lightly barred dusky. Orange morph replaces yellow areas of plumage with orange except on crown; whitish edging to feathers of hindneck and upper breast; various intermediate forms occur. Immature has more

extensive yellow or orange markings on underparts, with dull yellowish back and rump, bill brownish.

Habitat. Hill rain forest and edge, secondary growth, partially cleared areas, groves and suburban parks, occasionally savanna and plantations, up to 2400 m.

Food and Feeding. Nectar and perhaps pollen of *Elaeocarpus sphaericus*, *Schefflera*, *Sloanea*, *Pittosporum ramiflorum*, coconut blossoms, also fruit. Seen flocking in fruiting mango and other cultivated trees; pupae of teak moth (*Hyblaia pueri*) witnessed being taken.

Breeding. Nov-Apr in E Highlands, though breeding condition male taken there in Aug; Jul in Irian Jaya. Nest in hole high in tall montane tree, e.g. eugenia, beeches. In captivity: 2 eggs; incubation lasting c. 24 days; nestling period c. 70 days.

Movements. Nomadic, with displacements occurring in response to periods of high or low flowering. However, there may be some very regular migrations across the central mountain chain. E Highlands population leaves after Apr, perhaps retreating to C lowlands.

Status and Conservation. Not globally threatened. CITES II. Common and highly gregarious, sometimes forming roosts of several thousand birds; in one area of SE New Guinea density estimated at 30 birds/km².

Bibliography. Andrew (1992), Baptista (1990), Beehler (1978b), Beehler *et al.* (1986), Bell (1970a, 1979, 1982), Bishop (1987), Coates (1985), Courtney (1997b), Desborough (1991), Diamond (1972a), Gilliard & LeCroy (1961), Gregory (1995a, 1995b), Gyldestolpe (1955b), Hoogerwerf (1971), Mack & Wright (1996), Mackay (1970), Majnep & Bulmer (1977), Mayr & Rand (1937), Pagel & Greven (1990), Peters (1935), Rand (1942b), Rand & Gilliard (1967), Ripley (1964), Schodde & Hitchcock (1968), Schönwetter (1967), Wenner (1973, 1975).

Genus TRICHOGLOSSUS

Vigors & Horsfield, 1827

12. Ornate Lorikeet

Trichoglossus ornatus

French: Loriquet orné

German: Schmucklory

Spanish: Lori Adornado

Other common names: Ornate Lory

Taxonomy. *Psittacus ornatus* Linnaeus, 1758, America; error = Sulawesi.

Forms a superspecies with *T. haematodus*. Monotypic.

Distribution. Sulawesi and adjacent offshore islands.



Descriptive notes. 25 cm. Bill orange-red; crown and ear-coverts purplish black; face and postocular stripe red; side of neck yellow; throat and breast red broadly barred deep blue; belly green with some yellow edges, becoming regular on thighs and below; hindneck to tail green, wings with yellow leading edge and underwing-coverts yellow; tail below dull yellow. Immature has brownish bill and more yellow on belly.

Habitat. Peat and freshwater swamp forest, woodland, secondary forest and forest edge, bush, and near cultivation including coconut plantations, from sea-level to 1000 m in N &

C Sulawesi, to 1500 m in S.

Food and Feeding. May concentrate in large numbers to feed in flowering trees; *Tectona* and *Casuarina* seeds reported.

Breeding. Breeding condition birds, Sept-Oct. In captivity: 2 eggs; incubation 27 days; nestling period 80 days.

Movements. No information.

Status and Conservation. Not globally threatened. CITES II. Reported to be particularly common in coconut plantations and around villages in some parts; common in Dumoga-Bone National Park.

Bibliography. Andrew (1992), Andrew & Holmes (1990), van Bemmelen & Voous (1951), Bertagnolio (1970), Bishop (1992), Coates & Bishop (1997), Coomans de Ruiter & Maurenbrecher (1948), Fraser & Henson (1996), Harrison & Holyoak (1970), Holmes & Philipps (1996), Stresemann (1940), Watling (1983), Wheatley (1996), White (1977), White & Bruce (1986).

13. Rainbow Lorikeet

Trichoglossus haematodus

French: Loriquet à tête bleue

German: Allfarblori

Spanish: Lori Arcoiris

Other common names: Green-naped/Red-breasted/Coconut Lorikeet, Rainbow Lory; Red-collared Lorikeet (*rubritorquis*)

Taxonomy. *Psittacus haematod.* [sic] Linnaeus, 1771, Ambon.

Forms a superspecies with *T. ornatus*. Treatment of *rubritorquis* as a separate species is unsustainable without an extensive revision of whole of present species; birds of Lesser Sunda are at least as distinctive, and the case of the small green *weberi* presents a particular challenge to the present arrangement, although the view that it is closer to *T. euteles* than to present species appears mistaken. Three broad groups may be defined: (1) breast red and unbarred (first four races listed below); (2) breast yellow or green without dark barring (*fortis* to *flavotectus*); and (3) breast red and in general heavily to faintly barred (*rosenbergii* through to *moluccanus*); *rubritorquis* might be considered to form a fourth group. New Guinean populations of nominate race sometimes separated as race *berauensis*; proposed race *caeruleiceps* probably not separable from *nigroregularis*. Twenty subspecies recognized.

Subspecies and Distribution.

T. h. mitchellii G. R. Gray, 1859 - Bali and Lombok.

T. h. forsteni Bonaparte, 1850 - Sumbawa.

T. h. djampeanus Hartert, 1897 - Tanahjampea.

T. h. stresemanni Meise, 1929 - Kalaotoa.

T. h. fortis Hartert, 1898 - Sumba.

T. h. weberi (Büttikofer, 1894) - Flores.

T. h. capistratus (Bechstein, 1811) - Timor.

T. h. flavotectus Hellmayr, 1914 - Wetar and Romang.

T. h. rosenbergii Schlegel, 1873 - Biak I, off N Irian Jaya.

T. h. intermedius Rothschild & Hartert, 1901 - N New Guinea and Manam I from R Sepik E to Astrolabe Bay.

T. h. haematodus (Linnaeus, 1771) - S Moluccas and W Papuan Is E to NW New Guinea as far as Humboldt Bay and S New Guinea as far as upper R Fly; possibly W Kai Is.

T. h. nigrogularis G. R. Gray, 1858 - E Kai Is, Aru Is (except Spirit I) and S New Guinea from lower R Fly to Princess Marianne Straits.

T. h. brooki Ogilvie-Grant, 1907 - Spirit I, Aru Is.

T. h. micropteryx Stresemann, 1922 - E New Guinea E from Huon Peninsula in N, including Bagabag I, and Hall Sound in S.

T. h. nesophilus Neumann, 1929 - Ninigo and Hermit Groups, W of Manus.

T. h. flavicans Cabanis & Reichenow, 1876 - Admiralty Is and New Hanover.

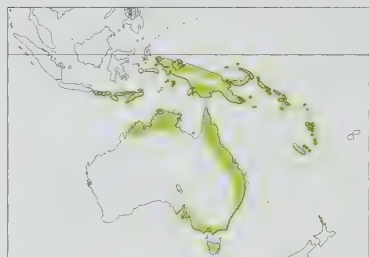
T. h. massena Bonaparte, 1854 - Karkar I, Bismarck Archipelago, Solomon Is and Vanuatu.

T. h. deplanchii J. Verreaux & Des Murs, 1860 - New Caledonia and Loyalty Is.

T. h. moluccanus (J. F. Gmelin, 1788) - Torres Strait islands, E & SE Australia and Tasmania.

T. h. rubritorquis Vigors & Horsfield, 1827 - N Australia.

Possibly introduced (*rubritorquis*) to Kisar, E of Timor; feral (*moluccanus*) in Perth (Western Australia).



Descriptive notes. 25-30 cm; 75-157 g. Bill orange to red; head blue to deep brown lightly flecked pale violet; nuchal collar yellow; rest of upperparts and tail green, latter dusky yellow below; breast red barred blue-black; belly dark green; thighs and undertail-coverts yellow barred dark green; underwing-coverts orange with broad yellow underwing bar. Immature duller, bill brownish. Races from Bali to Kalaotoa lack barring on breast; *fortis*, *capistratus* and *flavotectus* have orange-yellow breasts; *weberi* is small and all-green, yellowish green on breast; other races exhibit various permutations of basic *haematodus* coloration.

oration, e.g. different intensities and extent of blue on head, of colour of belly, barring on breast; in *moluccanus*, breast barring variable from slight to non-existent. Race *rubritorquis* fairly distinct, with clear orange-red breast, greenish black belly and broad orange-red nuchal collar.

Habitat. Most types of lowland and lower montane wooded country, including mangroves, nypa forest, freshwater swamp forest, primary rain forest, secondary growth, scrubby monsoon forest, savanna, riparian woodland, mallee, coconut and other plantations, gardens and suburban areas; tends to favour edges and disturbed vegetation rather than interior of closed-canopy formations. Birds at least visit but perhaps also survive year-round in scrub and plantations on very small atolls. Typically from sea-level to 500-700 m, but often higher depending on island, e.g. 2150 m on Lombok, 1200 m on Sumbawa, 1400 m on Flores and occasionally on Seram, and 2440 m in one part of New Guinea. On Kolombangara densities higher in montane (900-1200 m) than lowland forest, in contrast to *Chalcopsitta cardinalis*.

Food and Feeding. Nectar and pollen from native trees and shrubs, particularly *Eucalyptus* in Australia and Timor; also from *Pittosporum*, *Grevillea*, *Spathodea*, *Metroxylon*, *Schefflera*,

Pterocymbium, *Erythrina*, *Banksia*, *Melaleuca*, *Angophora*, *Bauhinia*, *Cocos* (of which the species is an important pollinator), *Xanthorrhoea*, *Bombax*, *Verticordia*, *Bletharocarya*, bottlebrush (Myrtaceae) and mistletoes (Loranthaceae); fruit of *Ficus*, *Trema*, *Muntingia*, citrus, papaya and mangoes opened by fruit-bats, seeds of *Cassia* and *Casuarina*, and pupae of the poinciana moth (*Pericyma cruegeri*). Now commonly use introduced plants in Australia including grains of *Sorghum*, seeds of *Solanum*, ripening cones of *Pinus*, fruit of *Annona*, *Cinnamomum*, berries of *Schinus*, apples and pears. Seen to eat at base of ant-plants *Myrmecodion*. In one part of Australia found to use 43 species of plant, 87% of the diet consisting of flowers.

Breeding. Activity throughout most of year in New Guinea; Feb-Aug on Flores; nest-prospecting Nov-Dec on Buru; Aug-Jan in Australia and Vanuatu; in Solomons Aug, when copulation and nests with chicks observed, but also Nov. Nest in deep unlined hole in limb or trunk of large tree; exceptionally, on Manus (Admiralty Is), nests in ground on tiny predator-free offshore islets. Eggs 1-3; incubation lasts c. 25 days; nestling period 7-8 weeks.

Movements. Local abundance on tropical islands may vary considerably with the phenology of flowering trees, but in some places, e.g. C New Guinea, the species has been judged sedentary. On groups of small islands birds commonly move from one to the other daily. In Australia birds are nomadic, presence or absence, or at least quantities, being governed by flowering events; this is particularly pronounced in S of range. Daily movements to offshore islands to and from feeding/roosting areas occur.

Status and Conservation. Not globally threatened. CITES II. Rare on Bali, but possibly a recent colonizer there from Lombok, although formerly common near Lake Bratan. Weakly marked race *djampeanus* likely to have been trapped to near-extinction on Tanahjampea, to which it is endemic; trapping has also rendered the population on Ambon very small. Common, Timor and Flores, but rare on Sumbawa probably owing to overtrapping for trade. Abundant, Seram. Abundant throughout much of New Guinea, and considered possibly the commonest parrot on the island; as many as 80 birds/km² estimated in one area of SE New Guinea. Common, Karkar. Common, New Britain. Abundant, New Georgia. Widespread in small numbers, Bougainville; elsewhere considered abundant in N Solomons. Fairly common, New Caledonia and adjacent islands. Abundant in N Australia, becoming less plentiful in SE and although once common in Victoria it is now relatively rare, but increasing around Melbourne and Canberra and still moderately common in South Australia; rare in Tasmania, where may be only visitor.

Bibliography. Beehler *et al.* (1986), Bell (1966, 1968, 1979, 1982), Blaber (1990), Blakers *et al.* (1984), Bowler & Taylor (1989), Bregulla (1992), Buckingham *et al.* (1995), Butchart *et al.* (1996), Cain (1955), Cain & Galbraith (1956), Cannon (1979a, 1984a, 1984c), Chapman & Hazelden (1994), Christidis & Boles (1994), Coates (1985), Coates & Bishop (1997), Courtney (1997b), Coyle (1988), Diamond (1972a), Diamond & LeCroy (1979), Dutton (1995), Forshaw (1981b), Gilliard & LeCroy (1961, 1967a), Gosper & Gosper (1996), Griffiths (1985), Hadden (1981), Hannecart & Létocart (1980), Hoogerwerf (1971), Jepson (1993), LeCroy *et al.* (1992), Leggett & Woodall (1987), Lever (1987), Low (1974, 1994b), MacKinnon & Philipps (1993), Mayr (1944b), Mayr & Rand (1937), McWhirter (1986a), Mees (1982a), Pagel & Greven (1990), Rand (1942a), Rand & Gilliard (1967), Rensch (1930), Richardson & Wooller (1990), Rose (1997b), Schodde (1977), Schodde & Hitchcock (1968), Serpell (1981, 1982, 1989), Sibley (1951), Smiet (1985), Stokes (1980), Ulrich *et al.* (1972), Utschick & Brandl (1989), Veerman (1991), Verheijen (1964), White & Bruce (1986), Wilson (1989), Wood, K.A. (1992), Wyndham & Cannon (1985).

inches 4
cm 10

PLATE 30



14. Olive-headed Lorikeet

Trichoglossus euteles

French: Lorient eutèle **German:** Gelbkopflori **Spanish:** Lori Humilde
Other common names: Perfect Lorikeet

Taxonomy. *Psittacus euteles* Temminck, 1835, Timor. Forms a broad superspecies with *T. flavoviridis*, *T. johnstoniae*, *T. rubiginosus* and *T. chlorolepidotus*. Some authors consider *T. haematodus weberi* as belonging to present species. Names *ochrocephalus* and *alorenensis* are synonyms of *euteles*. Monotypic.

Distribution. Timor and adjacent small islands from Lomblen E to Babar (Lesser Sundas).



Descriptive notes. 25 cm. Bill orange-red; head olive mustard with indistinct pale yellow streaks on crown; upperparts green, with green of nape extending as an indistinct but usually complete broad collar around throat; underparts below throat greenish yellow. Immature duller, head greener.

Habitat. Primary montane forest, secondary growth and savanna woodland at roughly 1000-2300 m, apparently replacing *T. haematodus* at these elevations on Timor, although occasionally found at sea-level; in lowlands on other islands.

Food and Feeding. No information other than

visits flowering trees and shrubs.

Breeding. No information from wild. In captivity: 3 eggs; incubation period 23 days.

Movements. Birds may descend below 1000 m in the dry season and disperse throughout the lowlands, but studies needed.

Status and Conservation. Not globally threatened. CITES II. A BirdLife "restricted-range" species. Local trade in the species exists.

Bibliography. Andrew (1992), Coates & Bishop (1997), Harrison & Holyoak (1970), Inskipp *et al.* (1996), Jepson & Monk (1995), Mayr (1944b), Noske (1995), Russell (1971), Sujatnika *et al.* (1995), Wheatley (1996), White & Bruce (1986).

15. Yellow-and-green Lorikeet

Trichoglossus flavoviridis

French: Lorient jaune et vert **German:** Celebeslori **Spanish:** Lori Verdigualdo
Other common names: Meyer's Lorikeet

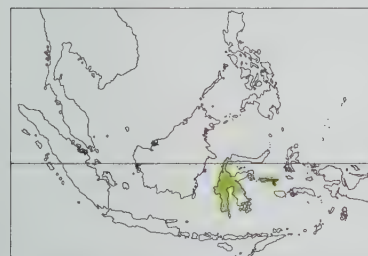
Taxonomy. *Trichoglossus flavoviridis* Wallace, 1863, Sula Islands.

Has on occasion been placed in genus *Psitteuteles*. Forms a broad superspecies with *T. euteles*, *T. johnstoniae*, *T. rubiginosus* and *T. chlorolepidotus*. Proposed races *bonthainensis* and *edithae* included in *meyeri*. Two subspecies currently recognized.

Subspecies and Distribution.

T. f. meyeri Walden, 1871 - Sulawesi.

T. f. flavoviridis Wallace, 1863 - Sula Is.



Descriptive notes. 21 cm. Bill orange; base of bill dusky brown with yellow edges spreading as almost pure yellow on crown and as yellow and green barring on underparts, becoming light and dark green barring on thighs and undertail-coverts; narrow line on hindcrown and sides of neck dusky; remainder of upperparts green. Immature more greenish. Race *meyeri* smaller, with much less yellow on head, and feathers of breast and upper belly greenish yellow edged with dark green.

Habitat. Lowland to upper montane forest and secondary growth, occasionally entering open country for access to flowering trees; appears

to replace *T. ornatus* at higher elevations on Sulawesi, although the two co-occur at forest margins; generally at 800-2400 m.

Food and Feeding. Blossoms of *Erythrina* and *Euphorbia* recorded.

Breeding. Jul, possibly Nov. One nest was high in a dead tree in moss forest at 2400 m. In captivity: 2 eggs; incubation lasting c. 23 days; nestling period c. 65 days or less.

Movements. No information.

Status and Conservation. Not globally threatened. CITES II. A BirdLife "restricted-range" species. Locally common. On Taliabu, Sula Is, most numerous in montane forest, which is still relatively secure and the target of a proposed reserve, but also common in degraded lowland areas.

Bibliography. Andrew (1992), van den Berg & Bosman (1986), Buckell (1996b, 1996c, 1996d), Coates & Bishop (1997), Davidson *et al.* (1995), Holmes & Philipps (1996), Low (1997b), Rozendaal & Dekker (1989), Serpell (1981, 1982, 1989), Stresemann (1940), Sujatnika *et al.* (1995), Watling (1983), Wheatley (1996), White & Bruce (1986).

16. Mindanao Lorikeet

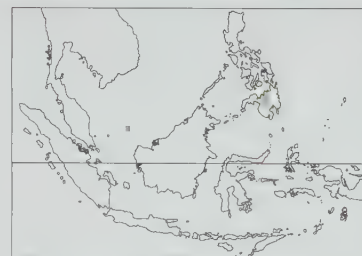
Trichoglossus johnstoniae

French: Lorient de Johnstone **German:** Mindanaolori **Spanish:** Lori de Mindanao
Other common names: (Mrs) Johnstone's/Apo Lorikeet

Taxonomy. *Trichoglossus johnstoniae* Hartert, 1903, Mount Apo, 8000 feet (c. 2400 m), Mindanao. Occasionally placed in genus *Psitteuteles*. Forms a broad superspecies with *T. euteles*, *T. flavoviridis*,

T. rubiginosus and *T. chlorolepidotus*. Population on Mt Malindang given name *pistra* but characters slight and intermediate birds now known from intervening areas. Monotypic.

Distribution. At least six montane areas of C Mindanao (SE Philippines).



Descriptive notes. 20 cm; 48-62 g. Bill reddish orange; front of head from forehead to chin and anterior ear-coverts red, scaled yellow, shading to green scaled yellow on rest of crown and face; purplish black line from lores through and behind eye to nape; underparts yellow broadly scaled green; upperparts green; tail green above, dusky yellowish below. Immature has less red on face, white orbital skin, darker bill.

Habitat. Montane forest and forest edge above 1000 m, with daily altitudinal movement, roosting in lower areas in the evening and returning to higher forest at sunrise.

Food and Feeding. Seen taking nectar from trees with scarlet blossoms; nothing else recorded.

Breeding. Breeding condition birds indicate Mar-May. In captivity: apparently 2 eggs; incubation lasting only 2 (probably 3) weeks; nestling period 5 weeks.

Movements. Seasonal or nomadic displacements in search of food unrecorded, but each evening birds make downslope flights to roosting areas and each morning return upslope to forage.

Status and Conservation. VULNERABLE. CITES II. A BirdLife "restricted-range" species. Recent fieldwork suggests it is now very uncommon, and that habitat destruction is constraining the lower reaches of its altitudinal range. Nevertheless, two of its six known mountain sites (Apo and Katanglad) are protected under the National Integrated Protected Areas Scheme (NIPAS), one (Malindang) has been declared a national park and will also qualify under NIPAS, and one (Matutum) is being targeted for early conservation attention.

Bibliography. Collar *et al.* (1994), Delacour & Mayr (1946), Dickinson *et al.* (1991), DuPont (1971), Goodfellow (1906), Hachisuka (1931b, 1934), Harrison & Holyoak (1970), Johnstone (1907), Rand & Rabor (1959, 1960), Ripley & Rabor (1961), Sargeant (1992), Sweeney (1997c, 1997g), Wheatley (1996).

17. Pohnpei Lorikeet

Trichoglossus rubiginosus

French: Lorient de Ponapé **German:** Kirschlori **Spanish:** Lori de Ponapé
Other common names: Pohnpei/Ponape Lory

Taxonomy. *Chalcopsitta rubiginosa* Bonaparte, 1850, islands of Barabai and Gebe; error = Pohnpei, Caroline Islands.

Forms a broad superspecies with *T. euteles*, *T. flavoviridis*, *T. johnstoniae* and *T. chlorolepidotus*. Monotypic.

Distribution. Pohnpei, E Caroline Is.



Descriptive notes. 24 cm; 70-85 g. Dark reddish maroon throughout, darkest on head but with vague greyish scaling on rest of body; orange bill, grey legs, wing feathers dark yellowish grey, tail greyish basally, dull yellow distally. Female has yellowish bill and greyish white (as against yellow-orange) iris. Immature like adult.

Habitat. Forest and plantations.

Food and Feeding. Nectar and pollen of coconut palms; also fruit and fly larvae.

Breeding. Breeding condition birds in Nov. Nest in hole in coconut palm or other large tree. 1 egg. No further information.

Movements. No information available.

Status and Conservation. Not globally threatened. CITES II. A BirdLife "restricted-range" species. Common, especially in lowland plantations.

Bibliography. Baker (1951), Dahl (1986), Mayr (1945), Pratt *et al.* (1987).

18. Scaly-breasted Lorikeet

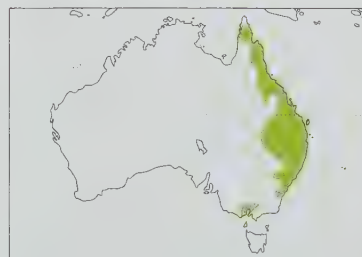
Trichoglossus chlorolepidotus

French: Lorient vert **German:** Schuppenlori **Spanish:** Lori Escumaviverde

Taxonomy. *Psittacus chlorolepidotus* Kuhl, 1820, New South Wales.

Forms a broad superspecies with *T. euteles*, *T. flavoviridis*, *T. johnstoniae* and *T. rubiginosus*. Formerly considered polytypic, with birds of N Queensland placed in race *neglectus*. Monotypic.

Distribution. E Australia. Population near Melbourne derived from escapes.



Descriptive notes. 23 cm; 70-89 g. Generally green; bill orange-red; breast and belly green heavily barred yellow; underside of wings largely red. Immature has dusky brown bill.

Habitat. Lowland wooded areas, flowering heathlands, *Melaleuca* swamps, urban parks and gardens, cultivated areas.

Food and Feeding. At least 25 species of plant recorded in diet, 99% consisting of flowers. Those of *Eucalyptus* are main food, but other important genera are *Banksia*, *Callistemon*, *Melaleuca* and *Tristania*. In particular, *E. tereticornis* and *E. pilularis* formed nearly 50% of food in one study, with a further 25% being

supplied by *E. drepanophylla*, *C. viminalis* and *M. quinquenervia*. Other food plants include *Erythrina*

indica, *Schefflera actinophylla*, *Pithecellobium saman*, *Grevillea robusta*, *Banksia serrata*, *Casuarina* and grass trees *Xanthorrhoea*. Although not so adaptable to exotic foods as *T. haematodus*, camphor laurel *Cinnomomum camphora* fruit now a regular seasonal component of some groups of birds. Recorded attacking ripening sorghum crops.

Breeding. May-Feb. in N of range apparently related to rainfall; Aug in Victoria. Unlined nest in hollow limb or hole high in tree. Eggs 2, occasionally 3; incubation lasting c. 25 days; nestling period c. 8 weeks.

Movements. Nomadic in response to flowering events, although in centre of range some birds seem to be present throughout the year.

Status and Conservation. Not globally threatened. CITES II. Common in C of range in SE Queensland and NE New South Wales, where large flocks occur; at N and S edges of range progressively rarer.

Bibliography. Blakers *et al.* (1984), Bruce (1973), Cannon (1984a, 1984c), Courtney (1997b), Forshaw (1981b), Gosper & Gosper (1996), Hamley (1977), Lavery (1970), Leggett & Woodall (1987), Lindsey, T.R. (1992), Macdonald (1988), Mitchell (1979), Pizzey & Doyle (1980), Rose (1997b), Schodde & Tidemann (1986), Serpell (1981, 1982, 1989), Simpson & Day (1996), Trounson & Trounson (1987), Wyndham & Cannon (1985).

Genus *PSITTEUTELES* Bonaparte, 1854

19. Varied Lorikeet

Psitteuteles versicolor

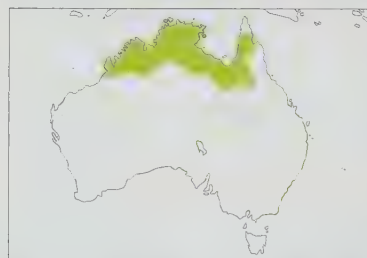
French: Loriqueet versicolore

German: Buntlori

Spanish: Lori Versicolor

Taxonomy. *Trichoglossus versicolor* Lear, 1831, Cape York, Queensland. Sometimes placed in genus *Trichoglossus*. Monotypic.

Distribution. N Australia from Kimberley division, Western Australia, to NE Queensland.



Descriptive notes. 18-19 cm; 51-62 g. Bill orange-red; forehead to mid-crown red; bare orbital ring white; ear-coverts tufted yellow; rest of head bluish green with narrow yellow streaking which extends over soft pink breast and pale green rest of underparts; mantle and wing-coverts green streaked with yellow; wings and tail duller green. Female has duller, less extensive red on crown. Immature duller, crown largely green, bill brownish.

Habitat. Wooded country, being especially attracted to paperbarks (*Melaleuca*) and eucalypts bordering streams and water-holes.

Food and Feeding. Pollen and nectar from the

flowers of bloodwoods *Eucalyptus terminalis* and *E. polycarpa*, also *E. tetradonta* and *E. pruinosa*, the paperbark *Melaleuca leucodendron*, kapok trees (*Cochlospermum heteronemum*), *Bauhinia* trees and *Grevillea pteridifolia*.

Breeding. Chiefly Apr-Aug, although recorded at all times of year. Nest in hollow limb or hole fairly high in tree. Eggs 2-5; in captivity, incubation lasts 20-23 days, and nestling period around 40 days.

Movements. Visitor only to E coast of Cape York Peninsula, and elsewhere nomadic in response to availability of blossom.

Status and Conservation. Not globally threatened. CITES II. Generally considered to be common in most habitats, but owing to nomadism it can disappear from some areas for long periods of time.

Bibliography. Blakers *et al.* (1984), Courtney (1997b), Forshaw (1981b), Lindsey, T.R. (1992), Macdonald (1988), Pizzey & Doyle (1980), Schodde & Tidemann (1986), Serpell (1981, 1982, 1989), Simpson & Day (1996), Sindel (1987), Storr (1977, 1980), Tarr (1963), Trounson & Trounson (1987).

20. Iris Lorikeet

Psitteuteles iris

French: Loriqueet iris

German: Irislori

Spanish: Lori Iris

Other common names: Iris Lory

Taxonomy. *Psittacus iris* Temminck, 1835, Timor.

Sometimes placed in *Trichoglossus* or even *Neopsittacus*. Validity of race *rubripileum* questionable, and claimed differences may be due to age or individual variation. Three subspecies recognized.

Subspecies and Distribution.

P. i. iris (Temminck, 1835) - W Timor.

P. i. rubripileum (Salvadori, 1891) - E Timor.

P. i. wetterensis (Hellmayr, 1912) - Wetar.



Descriptive notes. 20-22 cm. Bill orange red; crown red shading to blue-edged purple on hindcrown, bordered yellow on nape and green on upper mantle; broad patch behind eye purplish; rest of face and underparts yellowish green, latter with irregular narrow green bars; wings and tail green. Female has green forehead with some red. Immature like female with less red, bill brownish. Race *rubripileum* can have crown all red, or with some blue or green at rear; *wetterensis* larger, with more extensive red around crown.

Habitat. Primary and tall secondary monsoon forest, hill and lower montane forest and wood-

land, from sea-level to 1500 m, mainly above 600 m; on Wetar seen in scattered trees around a village.

Food and Feeding. Visits flowering trees including *Sesbania*.

Breeding. No information from wild. In captivity: 2 eggs; incubation lasting 23 days; nestling period 67 days.

Movements. No information, but predicted to wander in search of flowering trees.

Status and Conservation. VULNERABLE. CITES II. A BirdLife "restricted-range" species. Judged the least common of the three lorikeets on Timor in 1974, but presumably still relatively secure on a still partly forested and fairly large island; probably locally common at higher elevations on Mt Mutis. Species still present on Wetar in 1990. In period 1985-1990 reported international trade averaged 139 birds per year, but even this fairly modest rate may be excessive and in 1989 the EC banned the importation of the species from Indonesia.

Bibliography. Andrew (1992), Anon. (1993), Coates & Bishop (1997), Collar *et al.* (1994), Kyme (1975), Mayr (1944b), Noske (1995), Noske & Saleh (1993), Sujatnika & Jepsen (1995), Sujatnika *et al.* (1995), Walters (1984), Wheatley (1996), White & Bruce (1986).

21. Goldie's Lorikeet

Psitteuteles goldiei

French: Loriqueet de Goldie

German: Veilchenlori

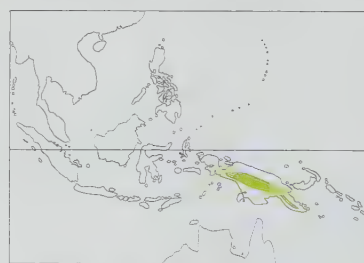
Spanish: Lori de Goldie

Other common names: Red-capped Streaked Lorikeet/Lory

Taxonomy. *Trichoglossus Goldiei* Sharpe, 1882, Astrolabe Mountains, New Guinea.

Sometimes placed in genus *Trichoglossus*, although present species possibly closer to *Charmosyna*. Monotypic.

Distribution. C New Guinea from Weyland Mts in W to Owen Stanley Range in E.



Descriptive notes. 19 cm; 45-61 g. Black bill; crown red with blackish line from loreal area back to hindcrown, bluish under eye, deep pink hood from throat to nape with regular dark streaking which extends over yellowish green mantle and undersides; upper back and tail green variably washed slightly brownish, wings and lower back dark green; yellow band across underside of flight-feathers. Female has duller, less extensive red in crown. Immature has green crown.

Habitat. In habits primary montane forest at mid-elevations, but ranging to sea-level and up to 2800 m where recorded in disturbed

Nothofagus-*Podocarpus* forest.

Food and Feeding. Flowers of *Elaeocarpus*, *Poikilospermum*, *Eucalyptus*, *Grevillea* and *Dimorphanthera*; apparently no other certain sources, but psyllid lerps may be an important food that draws birds into casuarinas.

Breeding. Sept-Oct. Nest in base of dead fronds in lower crown of *Pandanus* tree, in one case at moss forest/grassland edge. Eggs 2; in captivity incubation 23 days, nestling period 2 months.

Movements. Apparently nomadic in relation to flowering schedules of several canopy trees and lianas; for example, absent from an upland area of C Papua New Guinea, Dec-Jan, when known to be present in large numbers in a valley well to N.

Status and Conservation. Not globally threatened. CITES II. Generally fairly scarce but locally common (e.g. near Tari Gap, Papua New Guinea), presumably in response to local food availability.

Bibliography. Andrew (1992), Beehler (1978b), Beehler, Burg *et al.* (1994), Beehler, Pratt & Zimmerman (1986), Bell (1982), Coates (1985), Courtney (1997b), Diamond (1972a), Frith & Frith (1992), Gilliard & LeCroy (1961), Gregory (1995a, 1995b), Joshua (1993), Layton (1969), Mack & Wright (1996), Majnep & Bulmer (1977), Mayr & Rand (1937), Merck (1983), Plath (1951), Rand & Gilliard (1967), Vanderhoof (1993), Walters (1984).

Genus *LORIUS* Vigors, 1825

22. Chattering Lory

Lorius garrulus

French: Lori noire

German: Prachtlori

Spanish: Lori Gárrulo

Other common names: Yellow-backed Lory (*flavopalliatu*s)

Taxonomy. *Psittacus garrulus* Linnaeus, 1758, Halmahera.

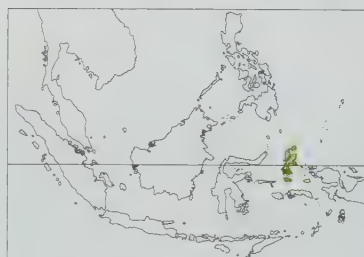
Genus name formerly given as *Domicella* Wagler, 1832, since *Lorius* Boddaert, 1783, applicable to *Eclectus*, had priority; however, Boddaert's name was officially suppressed in 1970, leaving *Lorius* Vigors, 1825, as the correct name for present species and congeners. Forms a superspecies with *L. domicella*, *L. lory* and *L. hypnochrous*. Three subspecies recognized.

Subspecies and Distribution.

L. g. morotaianus (van Bemmelen, 1940) - Morotai and Rau, N Moluccas.

L. g. garrulus (Linnaeus, 1758) - Halmahera and adjacent islands.

*L. g. flavopalliatu*s Salvadori, 1877 - Bacan, Obi, Kasiruta and Mandiole.



Descriptive notes. 30 cm. Mainly red, mantle sometimes with traces of yellow spotting; bill orange, basally dark; thighs and wings dull green; bend of wing and underwing-coverts yellow; broad red band across underside of primaries; tail distally dark green. Immature has brownish bill. Race *flavopalliatu*s has bold yellow patch on mantle and slightly brighter green wings; *morotaianus* has slight yellow mantle patch.

Habitat. Chiefly canopy of primary lowland and hill forest and edges, logged forest and mature secondary woodland adjacent to cultivated land, sometimes visiting coconut plan-

tations. Ranges from sea-level to 1000 m on Halmahera, to 1300 m on Bacan, and to 730 m on Obi; in proposed Lalobata reserve (Halmahera), densities found to increase with altitude.

Food and Feeding. Almost no information; nectar from various flowering trees, including coconut palms.

Breeding. Jun-Nov or beyond. Nest in hole typically in swelling on main trunk 20-25 m up in 30-35 m high tree; also in dead trees and broken palm stems. In captivity: 2 eggs; nestling period 76 days.

Movements. No information.

Status and Conservation. **VULNERABLE.** CITES II. A BirdLife "restricted-range" species. Population estimates for 1991 were: nominate *garrulus* 31,220-220,009; *flavopalliatius* 11,292-48,411 birds, with 4546-32,267 in Bacan group and 6746-16,144 in Obi group; *morotaianus* 3848-27,120. However, survey work in 1990's gave figures of 56,600-105,900 birds (nominate) for proposed Lalobata reserve alone, indicating that species might be more secure than was feared. Nevertheless, this species, reputedly a good talker, is one of the most important in domestic trade in Indonesia, and trapping pressure is very high: a minimum 9600 birds were estimated caught in 1991, a total which needs to be reduced by a factor of 10 to ensure sustainability. Habitat destruction in the Moluccas is still not a major concern, but logging will duly occur throughout the islands.

Bibliography. Andrew (1992), Anon. (1993), Bräutigam & Humphreys (1992), Coates & Bishop (1997), Collar *et al.* (1994), Collard (1965), Hartert (1903a), Lambert (1993a, 1993c), Lendon (1946), Linsley (1995), MacKinnon *et al.* (1995), Milton (1988), Pagel & Greven (1990), Robson (1994), Smiet (1985), Sujatnika & Jepson (1995), Sujatnika *et al.* (1995), Waugh (1996a, 1996b), Wheatley (1996), White & Bruce (1986).

23. Purple-naped Lory

Lorius domicella

French: Lori des dames

German: Erzlori

Spanish: Lori Damisela

Other common names: Purple-capped Lory

Taxonomy. *Psittacus Domicella* Linnaeus, 1758, Ambon.

Genus name formerly given as *Domicella* Wagler, 1832, since *Lorius* Boddaert, 1783, applicable to *Eclectus*, had priority; however, Boddaert's name was officially suppressed in 1970, leaving *Lorius* Vigors, 1825, as the correct name for present species and congeners. Forms a superspecies with *L. garrulus*, *L. lory* and *L. hypoinchrous*. Proposed species "*L. tibialis*" (Blue-thighed/Jamrach's Lory) was probably described from an aberrant specimen of present species. Species name sometimes erroneously spelt *domicellus*, but is a diminutive feminine noun. Monotypic.

Distribution. Seram and Ambon (S Moluccas). Feral population established on Buru, but probably now extinct.



Descriptive notes. 28 cm. Mainly red; bill orange; crown above line through eye to nape black, shading at rear to violet; variable yellow band across upper breast; thighs purplish blue; wings green with pale whitish blue at bend; underwing-coverts blue with broad yellow band across underside of flight-feathers; tail red tipped brownish red. Immature has deeper violet on nape, broader yellow band on breast, brownish bill.

Habitat. Hill forest, with a restricted altitudinal range from 400 m up to at least 1050 m; densities apparently highest in upper parts of this range, particularly above 800 m.

Food and Feeding. Recorded feeding acrobatically on pendant seeds of rattan and other plants. No further information available.

Breeding. No information from wild. In captivity: 2 eggs; incubation c. 24 days; nestling period c. 3 months.

Movements. No information; apparently sedentary.

Status and Conservation. **VULNERABLE.** CITES II. A BirdLife "restricted-range" species. Apparently a naturally low-density bird, uncommon to rare on Seram, with no recent reports from Ambon or Buru. Fair numbers trapped and kept by local villagers at Manusela National Park, Seram. **Bibliography.** Andrew (1992), Anon. (1994, 1997), Bowler & Taylor (1989, 1993), Coates & Bishop (1997), Collar & Andrew (1988), Collar *et al.* (1994), Inskipp *et al.* (1996), Kuah (1993), Robson (1988), Siebers (1930), Smiet (1985), Spence (1955), Stresemann (1914), Sujatnika *et al.* (1995), Wheatley (1996), White & Bruce (1986).

24. Black-capped Lory

Lorius lory

French: Lori tricolore

German: Frauenlori

Spanish: Lori Tricolor

Other common names: Western Black-capped/Tricoloured Lory

Taxonomy. *Psittacus Lory* Linnaeus, 1758, East Indies = north-western New Guinea.

Genus name formerly given as *Domicella* Wagler, 1832, since *Lorius* Boddaert, 1783, applicable to *Eclectus*, had priority; however, Boddaert's name was officially suppressed in 1970, leaving *Lorius* Vigors, 1825, as the correct name for present species and congeners. Forms a superspecies with *L. garrulus*, *L. domicella* and *L. hypoinchrous*. Seven subspecies recognized.

Subspecies and Distribution.

L. l. lory (Linnaeus, 1758) - W Papuan Is and Vogelkop (NW New Guinea).

L. l. cyanauchen (S. Müller, 1841) - Biak in Geelvink Bay.

L. l. jobiensis (A. B. Meyer, 1874) - Yapen and Mios Num in Geelvink Bay.

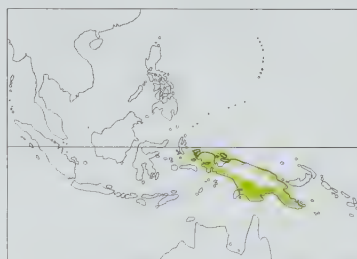
L. l. viridicrissalis de Beaufort, 1909 - N New Guinea from Humboldt Bay to Mamberano R.

L. l. salvadorii A. B. Meyer, 1891 - NE New Guinea from Aitape area to Astrolabe Bay.

L. l. erythrothorax Salvadori, 1877 - throughout S & E New Guinea except where replaced by *somu*.

L. l. somu (Diamond, 1967) - Papua New Guinea, in area between R Fly and R Purari.

Descriptive notes. 29-33 cm; 163-260 g. Bill orange, cere black; crown above line through eye purplish black; rest of head and throat red, shading to pink on narrow hindneck collar; upper mantle blackish with dark blue tinge, extending down sides of neck to join irregular blackish markings on breast, shading to purplish on belly, thighs and vent; sides of breast and flanks red; underwing-coverts red bordered by broad yellow band across base of flight-feathers, tips blackish; wings green above; tail above red, distally blue-black, below dull olive yellow. Immature has underwing-coverts blue. Race *erythrothorax* has breast red, less blue on nape; *somu* similar without any blue on nape; *cyanauchen* similar but blackish crown merges with blue nape; *salvadorii* like nominate but underwing-coverts dark blue; *viridicrissalis* similar but darker on nape, underwing-coverts mainly black; *jobiensis* like *salvadorii* but rosier breast, nape lighter blue.



Status and Conservation. Not globally threatened. CITES II. Generally a common though not abundant bird throughout its range, with 40 birds/km² estimated in on area of SE New Guinea.

Bibliography. Andrew (1992), Beehler (1978b), Beehler *et al.* (1986), Bell (1970c, 1982), Burgess (1921), Coates (1985), Courtney (1997b), Diamond (1967, 1972a), Gregory (1995a, 1995b), Hicks (1992), Hoogerwerf (1971), Mack & Wright (1996), Mayr & Meyer de Schauensee (1939a), Mayr & Rand (1937), Pearson (1975b), Peckover & Filewood (1976), Rand (1942a), Rand & Gilliard (1967), Ripley (1964), Rothschild (1931), Schodde & Hitchcock (1968), Watson *et al.* (1962).

25. Purple-bellied Lory

Lorius hypoinchrous

French: Lori à ventre violet

German: SchwarzsteiBlori

Spanish: Lori Ventrivinoso

Other common names: Eastern Black-capped Lory

Taxonomy. *Lorius hypoinchrous* G. R. Gray, 1859, Louisiade Archipelago = Sudest (Tagula) Island.

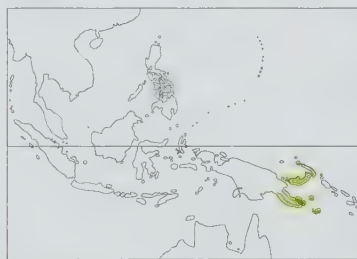
Genus name formerly given as *Domicella* Wagler, 1832, since *Lorius* Boddaert, 1783, applicable to *Eclectus*, had priority; however, Boddaert's name was officially suppressed in 1970, leaving *Lorius* Vigors, 1825, as the correct name for present species and congeners. Forms a superspecies with *L. garrulus*, *L. domicella* and *L. lory*. Proposed species "*L. amabilis*" (Stresemann's Lory) probably described from an aberrant individual of present species. Three subspecies recognized.

Subspecies and Distribution.

L. h. devittatus Hartert, 1898 - Bismarck Archipelago, SE New Guinea, Trobriand Is, D'Entrecasteaux Archipelago and Woodlark I.

L. h. hypoinchrous G. R. Gray, 1859 - Misima I and Tagula I (C Louisiade Archipelago).

L. h. rossellianus Rothschild & Hartert, 1918 - Rossel I (E Louisiade Archipelago).



Descriptive notes. 26-27 cm; 137-240 g. Similar to *L. lory somu* but with cere white, no black on belly, tail distally deep blue-green. Immature has brownish bill. Race *rossellianus* pinker red below, streaked violet; *devittatus* slightly larger, lacks black tips found on greater coverts of underwing in nominate.

Habitat. Coconuts apparently favoured, but also makes full use of original rain forest, mangroves, forest margins, tall secondary growth and partially cleared areas, up to 750 m in Bismarcks and up to 1600 m in D'Entrecasteaux Is. Where overlaps with *L. lory*, more a bird of coastal non-forest vegetation.

Food and Feeding. Fruit of the characteristic savanna tree *Antidesma gaisambulla*, flowers of *Plerandra*, blossoms or very tiny fruits of coconut trees.

Breeding. Reputedly mid-year, with nest placed high in huge tree.

Movements. No information.

Status and Conservation. Not globally threatened. CITES II. Common to abundant throughout its range.

Bibliography. Beehler (1978a), Beehler *et al.* (1986), Bell (1970a, 1970d), Clapp (1987b), Coates (1985), Diamond (1972a), Eastwood (1995c), Finch & McKean (1987), Gilliard & LeCroy (1967a), Hartert (1926b), LeCroy & Peckover (1983), LeCroy *et al.* (1984), Mayr & Rand (1937), Mayr & Van Deusen (1956), Orenstein (1976), Peckover & Filewood (1976), Rand & Gilliard (1967).

26. White-naped Lory

Lorius albidinuchus

French: Lori à nuque blanche

German: Weißnacktenlori

Spanish: Lori Nuquiblanco

Taxonomy. *Domicella albidinucha* Rothschild and Hartert, 1924, hills on south-east coast of New Ireland.

Genus name formerly given as *Domicella* Wagler, 1832, since *Lorius* Boddaert, 1783, applicable to *Eclectus*, had priority; however, Boddaert's name was officially suppressed in 1970, leaving *Lorius* Vigors, 1825, as the correct name for present species and congeners. Monotypic.

Distribution. SE New Ireland.



Descriptive notes. 26-28 cm; 120-146 g. Mainly red, including underwing-coverts; bill reddish orange; crown above line through eye black, bordered by white inverted triangular nuchal patch; indistinct narrow yellow band across breast; wings green, with broad yellow band across underside of flight-feathers; tail broadly tipped dull green above, dusky yellow below. Immature undescribed.

Habitat. Forest from 500-2000 m.

Food and Feeding. Fruits and flowers of a wild oil palm; seen feeding acrobatically in understorey.

Breeding. No information available.

Movements. No information available.
Status and Conservation. Not globally threatened. CITES II. Currently considered near-threatened. A BirdLife “restricted-range” species. Common locally throughout its altitudinal range.
Bibliography. Beehler (1978a), Coates (1985), Collar *et al.* (1994), Dahl (1986), Finch & McKean (1987).

27. Yellow-bibbed Lory

Lorius chlorocercus

French: Lori à collier jaune **German:** Grünschwanzlori **Spanish:** Lori Acollarado

Taxonomy. *Lorius chlorocercus* Gould, 1856, San Cristobal, Solomon Islands.
Genus name formerly given as *Domicella* Wagler, 1832, since *Lorius* Boddaert, 1783, applicable to *Eclectus*, had priority; however, Boddaert's name was officially suppressed in 1970, leaving *Lorius* Vigors, 1825, as the correct name for present species and congeners. Monotypic.
Distribution. E Solomon Is.
Descriptive notes. 28 cm; 153-225 g. Mainly red; bill orange; crown to nape above line through eye black; blackish markings on sides of neck linked by narrow yellow line across lower throat; wings green above with white at bend, below blackish with broad red patch across underside of



Status and Conservation. Not globally threatened. CITES II. A BirdLife “restricted-range” species. Generally fairly common, and the commonest large parrot on Guadalcanal and San Cristobal. A popular local cagebird and occasionally shot for food. Rare on Rennell.
Bibliography. Buckingham *et al.* (1995), Cain & Galbraith (1956), Dahl (1986), Harrison & Holyoak (1970), Mayr (1931, 1945b), Sweeney (1993b), Tiskens (1996).

primaries; underwing-coverts, flanks and thighs purplish blue; tail tipped green above, dusky yellow below. Immature lacks black and yellow on neck and throat.
Habitat. Canopy of primary forest, second growth and sometimes coconut plantations, at all altitudes; commoner in hills, especially mist forest, than lowlands, and in primary habitats than disturbed areas.
Food and Feeding. Pollen, nectar, fruits, small seeds and caterpillars recorded.
Breeding. No information except gonads undeveloped in Jun, Jul and Nov.
Movements. No information.





PLATE 31

inches 3
cm 8

Genus *PHIGYS* G. R. Gray, 1870

28. Collared Lory

Phigys solitarius

French: Lori des Fidji **German:** Einsiedlerlori **Spanish:** Lori Solitario
Other common names: Collared Lorikeet, Solitary Lory/Lorikeet

Taxonomy. *Psittacus solitarius* Suckow, 1800, Fiji Islands.

Genus is osteologically very similar to *Vini* and may not merit recognition. Monotypic.

Distribution. Fiji, occurring on the larger islands and on Makogai in Lomaiviti group.



Descriptive notes. 20 cm; 71–92 g. Bill orange; crown above line through eye glossy purplish black, bordered on nape by elongated bright yellowish green feathers; back, wings and tail green; face below eye, upper back and undersides down to mid-belly red; lower belly blackish purple, green on vent and undertail-coverts; legs orange. Female has paler, bluish fore-crown, more green on collar. Immature duller green and non-elongate on nape, with darker bill and legs.

Habitat. Forested areas up to 1200 m or more, being plentiful in wetter windward areas, less so in leeward coastal farmlands; also plantations and tree-lined streets in villages and towns.

Food and Feeding. Blossoms of coconut palms, *Erythrina indica* and *Spathodea campanulata*; also fruits of cultivated mango (*Mangifera indica*) and soursop (*Annona muricata*).

Breeding. Jul, Nov–Dec. Nest in hole in tree or stump, sometimes in rotting coconut still attached to tree. Eggs 2; in captivity, incubation c. 30 days, nestling period c. 9 weeks.

Movements. Seasonal movements reported in some areas, in response to annual availability of food, e.g. birds move into the Sigatoka valley, Viti Levu, when *Erythrina* trees bloom in Aug–Sept.

Status and Conservation. Not globally threatened. CITES II. A BirdLife “restricted-range” species. Common in forests and wetter areas on Viti Levu and Vanua Levu; also common on 10 km² Makogai I; rare on Ngau possibly owing to nest-site competition from the common *Prosopaea tabuensis*.

Bibliography. Bahr (1912), Clunie (1984), Courtney (1997b), Dahl (1986), Gorman (1972, 1975), Holyoak (1979), Lever (1987), Low (1994b), Mayr (1945b), Patten (1941), Pratt *et al.* (1987), Schroeder (1993), Steadman & Zariello (1987), Watling (1982a, 1982b, 1985).

Genus *VINI* Lesson, 1831

29. Blue-crowned Lorikeet

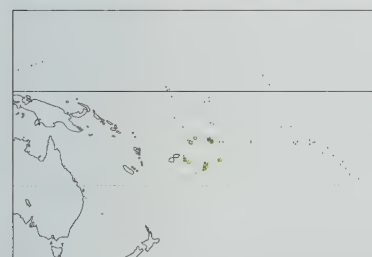
Vini australis

French: Lori fringillaire **German:** Blaukäppchen **Spanish:** Lori de Samoa
Other common names: Blue-crowned Lory

Taxonomy. *Psittacus australis* J. F. Gmelin, 1788, Sandwich Islands; error = Samoa Islands.

Monotypic.

Distribution. Lau Archipelago (E Fiji), Futuna and Wallis Is to Samoa and Tonga and on to Niue.



Descriptive notes. 19 cm; 47–52 g. Orange bill, grass green forehead backed by pale bright purplish blue mid- to hindcrown with slightly elongate feathers; patch from lores and below eye to upper breast red; rest of body green except for a red belly patch that shades purple between and onto thighs, underside of tail yellowish, legs orange. Immature has less colour on undersides.

Habitat. Forest, scrub, gardens and plantations, wherever flowering trees are present; commoner or more easily detected in cultivated areas than in forest, but much rarer in cleared forest or urban land.

Food and Feeding. Nectar, pollen and soft fruit, with a preference for coconut, mango, *Erythrina*, *Elaeocarpus angustifolius* and *Calophyllum inophyllum*. However, on Niuafo’ou flowering *Casuarina* is a key food source, others being *Sterculia fanaiho*, *Kleinhovia hospita*, *Musa paradisiaca*, *Alphitonia ziziphoides*, *Pueraria lobata*, *Barringtonia asiatica*, *Hibiscus tiliaceus* and *Pometia pinnata*; elsewhere flowers of thatching palm *Metroxylon* noted. Use of unripe mangoes and flowers of a woody weed *Stachytarpheta urticifolia* was probably the result of food shortage following a hurricane.

Breeding. Possibly throughout year as records are for Mar, Jun, Aug & Dec (nestlings). Nest a hole in a tree, once a *Hibiscus*; records of using holes in earth banks probably involved takeovers of old kingfisher nests. Eggs 1–2; incubation in captivity 23 days.

Movements. Birds are highly mobile, moving about within islands in search of foods as they become available, and apparently a well-known inter-island nomad.

Status and Conservation. Not globally threatened. CITES II. A BirdLife “restricted-range” species. Common throughout much of range, including Lau Archipelago, Samoa and Futuna, with numbers estimated between several 100’s and several 1000’s; but on Wallis, extinct for unknown reasons, though probably due to black rats (*Rattus rattus*). Declining in Tonga, but abundant on Niuafo’ou (several thousand pairs) and, by 1974 report, Niuaotuputu, while uncommon on Late, probably owing to scarcity of flowering trees. A population of around 60 survives on ‘Eue’iki in the Tongatapu group, 1990, where isolated for probably 100 years. The extinction of the species on ‘Eua occurred within 50 years of the island’s colonization by *R. rattus*. The steady spread of the Jungle Myna (*Acridotheres fuscus*) through the Fijian, Tongan and Samoan archipelagos is viewed with concern, given its aggressive ability to compete for nest-holes.

Bibliography. Amerson *et al.* (1982), Armstrong (1932), Banks (1984), Campbell (1993), Clunie (1984), Courtney (1997b), Dhondt (1976), Engbring & Ramsey (1989), Evans, S.M. *et al.* (1992), Gill (1995), Guyot & Thibault (1987, 1988), Hay (1986), Low (1994b), Mayr (1945b), Muse & Muse (1982), Pratt *et al.* (1987), Reed (1980b), Rinke (1985, 1986a, 1986b, 1991), Rinke *et al.* (1992), Watling (1982a).

30. Rimatara Lorikeet

Vini kuhlii

French: Lori de Kuhl **German:** Rubinlori **Spanish:** Lori de Rimatara
Other common names: Scarlet-breasted/Kuhl’s/Ruby Lorikeet/Lory

Taxonomy. *Psittacula Kuhlhi* Vigors, 1824, Toohooteterooha Island, a day’s sail from Otaheite. Monotypic.

Distribution. Rimatara in Cook Is: Kiritimati (Christmas), Tabuaeran (Fanning) and Teraina (Washington) in N Line Is. Kiribati.



Descriptive notes. 19 cm. Bill orange; crown above line through eye green and nape purplish blue, all with slightly elongate feathers; underparts red; thighs purple; mantle green shading darker on wings and to yellowish on back, rump, upper- and undertail-coverts and vent; tail above dark reddish centrally with dark outer feathers, greyish below; legs orange-brown. Immature barred purple below, less red in tail.

Habitat. On Rimatara birds appear to favour the mixed horticultural belt (61% of the population in 32% of its available area), being uncommon in coastal coconut plantations and rare in makatea forest. On Teraina birds use all terrestrial habitats including coconut-dominated forest, stands of *Pisonia grandis*, *Pandanus* areas and a coastal fringe of *Messerschmidia argentea*, *Scaevola taccada* and *Cordia subcordata*.

Food and Feeding. On Rimatara 12 recorded foodplants (flowers) in Aug, in descending order of importance, were: *Inga ynga*, *Casuarina equisetifolia* (seeds), *Paraserianthes falcata*, *Musa*, *Mangifera*, *Ceiba pentandra*, *Cocos nucifera*, *Hibiscus rosa-sinensis*, *Erythrina variegata*, *Adenanthera pavonina*, *Syzygium jambos*, *Albizia lebbek*; at other seasons flowers of *Coffea arabica* and *Hibiscus tiliaceus* and rotting leaf borders of *Barringtonia asiatica*. On Teraina *Terminalia catappa* and *Premna obtusifolia* noted.

Breeding. Jan–Apr. Nests in coconut palms, once reportedly in the rotten trunk of a *Pandanus*. In captivity: 2 eggs; nestling period c. 7 weeks.

Movements. Sedentary.

Status and Conservation. ENDANGERED. CITES II. A BirdLife “restricted-range” species. This species was almost certainly introduced to Tabuaeran and Teraina, and is known to have been to Kiritimati. It is not common on Rimatara, its one remaining native island, with a total population of 900 estimated in Aug 1992. Fewer than 50 were judged present on Tabuaeran in Feb 1993, apparently having declined in response to colonization by the black rat *Rattus rattus*. On Teraina 1000–1600 birds were estimated present in Feb 1993. On Kiritimati a few birds survive from several small releases since 1959, but conditions on the island are unfavourable. Extinction on other islands in the Cooks appears to be the result of over-exploitation for use of feathers by native peoples. Introduction to ‘Atiu, free of black rats, should be undertaken. There is a clear need for greater awareness of the international significance of Teraina’s population. Keeping black rats off both Rimatara and Teraina is essential.

Bibliography. Bruner (1972), Collar & Andrew (1988), Collar *et al.* (1994), Gallagher (1960), Garnett (1983), Hay (1986), Holyoak & Thibault (1984), King (1973), Kirby (1925), Lee (1935), Lever (1987), Low (1994b), McCormack (1997), McCormack & Künzle (1996), Patten (1947), Pratt *et al.* (1987), Seitre, J. & Seitre (1991), Seitre, R. & Seitre (1992), Steadman (1985), Thibault (1973b), Watling (1995).

31. Henderson Lorikeet

Vini stepheni

French: Lori de Stephen **German:** Hendersonlori **Spanish:** Lori de Stephen
Other common names: Stephen’s Lorikeet/Lory

Taxonomy. *Calliptilus ? stepheni* North, 1908, Henderson Island. Monotypic.

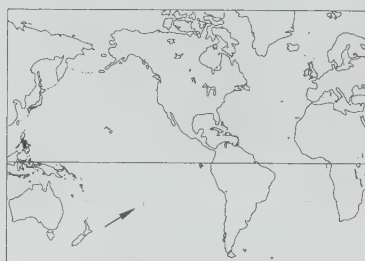
Distribution. Henderson I, in the Pitcairn Group.

Descriptive notes. 19 cm; 42–55 g. Similar to *V. kuhlii* but lacks purplish blue nape and has broken green breastband, less bright rump and longer, wedge-shaped all-yellowish tail. Immature has mostly green underparts.

Habitat. Native forest, which covers the island.

Food and Feeding. A variety of food types, including nectar, pollen, fruit and insect larvae, from canopy level in coconut palms to ground-level shrubs, species involved being: nectar and/or pollen

On following pages: 32. Blue Lorikeet (*Vini peruviana*); 33. Ultramarine Lorikeet (*Vini ultramarina*); 34. Musk Lorikeet (*Glossopsitta concinna*); 35. Little Lorikeet (*Glossopsitta pusilla*); 36. Purple-crowned Lorikeet (*Glossopsitta porphyrocephala*); 37. Palm Lorikeet (*Charmosyna palmarum*); 38. Red-chinned Lorikeet (*Charmosyna rubrigularis*); 39. Meek’s Lorikeet (*Charmosyna meeki*); 40. Blue-fronted Lorikeet (*Charmosyna toxopei*); 41. Striated Lorikeet (*Charmosyna multistriata*); 42. Pygmy Lorikeet (*Charmosyna wilhelminae*); 43. Red-fronted Lorikeet (*Charmosyna rubronotata*); 44. Red-flanked Lorikeet (*Charmosyna placentis*); 45. New Caledonian Lorikeet (*Charmosyna diadema*); 46. Red-throated Lorikeet (*Charmosyna amabilis*).



Status and Conservation. VULNERABLE. CITES II. A BirdLife "restricted-range" species. Numbers were estimated in 1987 at 720-1820 birds and in 1992 at 2400 birds. Population essentially secure so long as no settlement of its 37 km² sole home is attempted, bringing with it the increased chance of colonization by black rats *Rattus rattus*; one such attempt was headed off in 1983.

Bibliography. Amadon (1942), Benton & Spencer (1995), Bourne & David (1983), Collar & Andrew (1988), Collar *et al.* (1994), Dahl (1986), Fosberg *et al.* (1983), Graves (1992), Holyoak & Thibault (1984), Pratt *et al.* (1987), Serpell *et al.* (1983), Trevelyan (1995), Williams (1960).

32. Blue Lorikeet

Vini peruviana

French: Lori nonnette **German:** Saphirlori

Spanish: Lori Monjita

Other common names: Tahitian Lorikeet/Lory

Taxonomy. *Psittacus peruvianus* P. L. S. Müller, 1776, Peru; error = Tahiti. Monotypic.

Distribution. Aitutaki in Cook Is; Motu One and Manuae in Society Is; and Rangiroa, Arutua, Apataki and Tikehau in Tuamotu Archipelago.



Descriptive notes. 18 cm; 31-34 g. Orange bill and legs, white from line through eye to ear-coverts down to breast, otherwise deep purplish blue, with feathers of crown somewhat elongate. Immature below greyish blue with whitish markings on chin, bill black.

Habitat. Birds occupy any wooded habitats, with a possible preference, perhaps only seasonal, for coconut and banana plantations, but mixed stands of native and cultivated trees seem generally favoured. On low sandy islets (*motus*) of atolls, found in flowering plants, e.g. *Scaevola*.

Food and Feeding. Flowers, and/or their products, of coconut, banana, hibiscus, mango and

Tournefortia, leaf shoots of mango, fruit of *Morinda citrifolia* and banana.

Breeding. May-Jul claimed, but Oct and Dec-Jan recorded. An Aitutaki nest was 11 m up in hole at base of broken branch of Java plum (*Syzygium cumini*); one on Manuae was in a hole high in a dead *Pandanus*. Eggs 2; incubation in captivity 25 days, nestling period c. 60 days.

Movements. Occupation of areas may be related to food availability; few birds were present in S of Aitutaki, Feb 1991, but birds were common there in Oct 1995.

Status and Conservation. VULNERABLE. CITES II. A BirdLife "restricted-range" species. Extinctions have occurred on many islands within this species's range, only partly compensated by one spectacular introduction (to Aitutaki). Populations judged as follows: Motu One 500 birds, Manuae 600-800, Rangiroa possibly several hundred, Arutua unknown, Apataki at least 300 on one *motu*, Tikehau 60, Aitutaki c. 1200. Survival of this species is related to the absence of black rats (*Rattus rattus*), and conservation awareness relating to the prevention of the introduction of this animal is essential. Also important will be the checking of some still unexplored islands in case they hold populations, and the translocation of birds to rat-free islands. Although trade is illegal, birds are still captured and sold on Rangiroa.

Bibliography. Amadon (1942), Bruner (1972), Child (1981), Collar & Andrew (1988), Collar *et al.* (1994), Courtney (1997b), Gill (1996), Harrison & Holyoak (1970), Hay (1986), Holyoak (1973b, 1974b, 1980), Holyoak & Thibault (1984), King (1978/79), Lever (1987), Low (1985, 1994b), McCormack (1997), Poulsen *et al.* (1985), Pratt *et al.* (1987), Seitre, J. & Seitre (1991), Seitre, R. & Seitre (1992), Taylor (1984), Thibault, B. & Thibault (1973), Thibault, J.C. (1974, 1988), Voisin *et al.* (1996), Wilson, K.J. (1993), Yealland (1940).

33. Ultramarine Lorikeet

Vini ultramarina

French: Lori ultramarin **German:** Ultramarinlori

Spanish: Lori Ultramar

Other common names: Ultramarine Lory

Taxonomy. *Psittacus ultramarinus* Kuhl, 1820, New Holland?; error = Marquesas Islands. Monotypic.

Distribution. Ua Pou and Ua Huka, and possibly still Nuku Hiva, in Marquesas Is, with a small new population on Fatu Hiva. Pre-historically on Ua Huka and Tahuata.



Descriptive notes. 18 cm. Bill orange; forehead cobalt blue, rest of crown purple-blue with slightly elongate feathers; rest of upperparts dull, slightly turquoise blue, increasingly pale through rump to tail which shades white at tip; front of face white, chin, ear-coverts, throat and breast mottled white and dark purple; belly purple, with extensive white lower flank patches; legs dull orange. Immature mostly lacks breast mottling.

Habitat. Wooded vegetation wherever flowering trees occur, from native forest in hills to coconut plantations and *Erythrina* trees near coasts.

Food and Feeding. Flowers, and/or their products, of coconut and banana, buds, fruits of breadfruit (*Artocarpus altilis*) and mango (*Mangifera indica*), and hemipteran adults and grubs.

Breeding. Reportedly Jun-Aug, but bird in breeding condition in Sept. Nest in hollow in tree, a still-hanging old coconut, or old nests made by finches and other birds. In captivity: 2 eggs; nestling period c. 8 weeks.

Movements. Sedentary.

Status and Conservation. ENDANGERED. CITES II. A BirdLife "restricted-range" species. Almost certainly black rats (*Rattus rattus*) are responsible for the decline of this species, which was formerly widespread. It declined from 500-600 birds on Ua Pou in 1975 to be rare by 1990, probably owing to the advent of rats around 1980. On Nuku Hiva an estimated 70 birds in 1975 declined possibly to extinction by 1990. On Ua Huka the species was introduced or reintroduced around 1940, and by 1991 some 1000-1500 birds were present. In attempt to establish viable population on another less disturbed island of former range, total of 29 birds relocated on Fatu Hiva in period 1992-1994; subsequent survey work indicates birds surviving and possibly breeding, with intensive survey planned for 1997.

Bibliography. Anon. (1997d), Collar & Andrew (1988), Collar *et al.* (1994), Harrison & Holyoak (1970), Hay (1986), Holyoak (1975), Holyoak & Thibault (1984), King (1978/79), Kuehler & Lieberman (1993a, 1993b), Kuehler *et al.* (1997), Lever (1987), Lieberman *et al.* (1997), Low (1994b), Montgomery *et al.* (1980), Pratt *et al.* (1987), Seitre, J. & Seitre (1991), Seitre, R. & Seitre (1992), Steadman (1989a), Steadman & Zarriello (1987), Tavistock (1939), Thibault, B. & Thibault (1973), Thibault, J.C. (1973a, 1988).

Genus GLOSSOPSITTA Bonaparte, 1854

34. Musk Lorikeet

Glossopsitta concinna

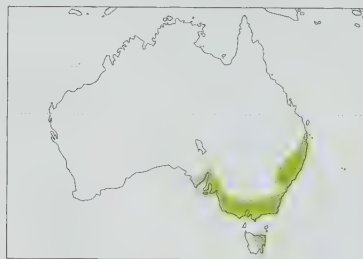
French: Lori à bandeau rouge

German: Moschuslori

Spanish: Lori Almiclero

Taxonomy. *Psittacus concinnus* Shaw, 1791, New South Wales. Monotypic.

Distribution. E & SE Australia, Kangaroo I and Tasmania.



Descriptive notes. 22 cm; 52-65 g. Bill blackish tipped orange; forecrown and ear-coverts red, with light blue streaking below eye; mid-crown dull blue shading to green on hindcrown and to olive-yellow on nape and mantle; back and wings green; tail green, with basal red on underside of lateral feathers; underparts and underwing-coverts yellowish green, yellow along upper flanks; legs greyish. Female has less extensive blue on crown. Immature duller, with dull red head markings.

Habitat. Wooded country, preferring more open habitats such as eucalypt woodland, riparian growth and farmland groves, penetrat-

ing suburban areas and parks.

Food and Feeding. Nectar, pollen and blossoms, especially of eucalypts, flowers, young shoots and buds of *Callistemon citrinus*, *Grevillea robusta* and *Angophora*; also berries, fruits, seeds and insects, sometimes becoming a pest in orchards and on maize and sorghum crops.

Breeding. Aug-Jan. Nest in hollow limb or hole in tree, usually high in a living eucalypt near water. Eggs usually only 2; in captivity, incubation 21-22 days (28-30 days also recorded), nestling period 45-50 days.

Movements. Nomadic. Birds move about in response to flowering of trees, but apparently in a more predictable pattern than other lorikeets, birds tending to visit a particular area at regular intervals over a number of years. However, in some fruit-growing areas of Tasmania the birds' presence is difficult to predict, with large flocks often forming.

Status and Conservation. Not globally threatened. CITES II. Very common throughout mainland Australian range except in alpine region.

Bibliography. Blakers *et al.* (1984), Courtney (1997b), Emison *et al.* (1987), Forshaw (1981b), Lea & Gray (1935), Lindsey, T.R. (1992), Macdonald (1988), McCulloch (1981), Pizzey & Doyle (1980), Rose (1997b), Schodde & Tidemann (1986), Simpson & Day (1996), Traill *et al.* (1996), Trounson & Trounson (1987), Wilkinson *et al.* (1993), Wood, K.A. (1992).

35. Little Lorikeet

Glossopsitta pusilla

French: Lori à masque rouge

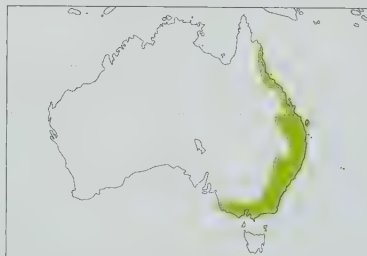
German: Zwergmoschuslori

Spanish: Lori Carirrojo

Taxonomy. *Psittacus Pusillus* Shaw, 1790, New South Wales.

Forms a parapatric species pair with *G. porphyrocephala*. Monotypic.

Distribution. E & SE Australia; also reported to occur in Tasmania.



Descriptive notes. 15 cm; 34-53 g. Generally green, more yellowish below; black bill; front of head around bill, from forehead through eye to chin, red; pale green streaking on ear-coverts; light bronze tinge to nape and mantle; tail below red basally, shading to yellow with grey tips. Immature has duller red face.

Habitat. Canopy of trees in open wooded country, particularly in riparian stands of *E. camaldulensis* and associated box-ironbark forests, but possibly also in denser forest, where less easily detected; occurs at all altitudes within range.

Food and Feeding. Pollen, nectar, blossoms of *Eucalyptus* (in winter *E. sideroxylon* and *E. leucoxylon*), *Melaleuca* and *Xanthorrhoea* trees,

flowers and juice of mistletoe *Amyema cambagei* and *A. gaudichaudi*, berries of *Loranthus* and fruit of *Eriobotrya japonica*; birds visit orchards but are not serious pests.

Breeding. Jun-Jan, as early as May in N. Nest in hollow limb or hole in tree, usually a living eucalypt near water, 7-12 m up. Eggs 3-5; in captivity, incubation lasts 22 days, nestling period c. 6 weeks.

Movements. Nomadic, following flowering events in different areas.

Status and Conservation. Not globally threatened. CITES II. Common to abundant in centre of range in S Queensland and New South Wales, becoming moderately common to uncommon at the extremities. Of several records from Tasmania only one involved positive identification, and there is no recent evidence.

Bibliography. Barnicoat (1976), Blakers *et al.* (1984), Courtney (1997b), Emison *et al.* (1987), Forshaw (1981b), Haines (1946), Lendon (1951), Lindsey, T.R. (1992), Macdonald (1988), Pizzey & Doyle (1980), Schodde & Tidemann (1986), Simpson & Day (1996), Troupson & Troupson (1987).

36. Purple-crowned Lorikeet

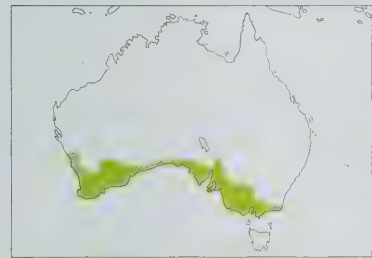
Glossopsitta porphyrocephala

French: Lori à couronne pourpre **German:** Blauscheitellori **Spanish:** Lori Coronipúrpura

Taxonomy. *Trichoglossus porphyrocephalus* Dietrichsen, 1837, South Australia.

Forms a parapatric species pair with *G. pusilla*. Monotypic.

Distribution. SW & SE Australia including Kangaroo I. with vagrant flocks recorded as far N as SE Queensland.



Descriptive notes. 15 cm; 37-50 g. Bill black; frontal band and lores fiery red; crown deep purple; upper cheek to nape light green, except ear-coverts orange-yellow; chin and lower cheek to mid-belly pale blue, shading on flanks, thighs and lower belly to light green; mantle stained olive brown; rest of upperparts rich green; leading edge of wing blue; underwing-coverts red, underside of flight-feathers brown. Immature has reduced head colour.

Habitat. Lightly wooded inland country, notably dry mallee areas and open savanna, but also heavy *Eucalyptus* forest and coastal scrublands, often plentiful in suburbs.

Food and Feeding. Nectar and pollen from blossoms of various *Eucalyptus* (at least 13 species identified), *Melaleuca* and *Myoporum insulare* trees, sometimes moving to heathland for *Banksia* flowers in winter; fruits may also be taken, and the species may cause damage in orchards.

Breeding. Aug-Dec. Nest in hollow limb or hole in tree, usually a living or dead eucalypt near water. Often loosely colonial. Eggs 3-4; in captivity, incubation 22 days, nestling period c. 6 weeks.

Movements. Partly nomadic, some birds seemingly sedentary but others forming large flocks, and in Victoria (except extreme W) its presence in any area being related to the flowering of eucalypts. Birds regularly penetrate far SW New South Wales, and vagrants have reached SE Queensland.

Status and Conservation. Not globally threatened. CITES II. Common in most of range, becoming less frequent in Victoria; however, a substantial chronic decline in numbers documented in SW Australia.

Bibliography. Blakers *et al.* (1984), Carter (1923), Churchill & Christensen (1970), Emison *et al.* (1987), Forshaw (1981b), Hopper (1980), Hopper & Burbidge (1979), Lindsey, T.R. (1992), Macdonald (1988), Masters & Milhinch (1974), Pizzey & Doyle (1980), Richardson & Wooller (1990), Saunders & Ingram (1995), Schodde & Tidemann (1986), Simpson & Day (1996), Troupson & Troupson (1987), Wooller *et al.* (1988).

Genus CHARMOSYNA Wagler, 1832

37. Palm Lorikeet

Charmosyna palmarum

French: Lori des palmiers **German:** Palmenlori **Spanish:** Lori Palmero

Taxonomy. *Psittacus palmarum* J. F. Gmelin, 1788, Tanna Island.

Monotypic.

Distribution. Vanuatu, Banks Is, Santa Cruz Is and Duff Is.



Descriptive notes. 15-17 cm. Green, with rather small red patch around bill from lores to chin; mantle washed pale brown; underwing-coverts greyish green; tail tipped yellow; bill and legs orange. Female has red reduced or lacking, no brown. Immature like female.

Habitat. Montane and lowland forest, but seemingly intolerant of disturbed areas at lower levels.

Food and Feeding. Nectar and pollen of various trees, palms, lianas and shrubs, notably from flowers of sago palms (*Metroxylon rumphii*) and *Erythrina*; also takes fruit of figs (*Ficus*) and berries.

Breeding. One nest on Vanuatu in Dec, was in hollow limb of tree c. 6 m up, in cloud forest (at 1600 m), with two half-grown young.

Movements. Apparently nomadic, travelling widely between feeding areas and appearing unpredictably in coastal areas, sometimes in large numbers.

Status and Conservation. Not globally threatened. CITES II. Currently considered near-threatened. A BirdLife "restricted-range" species. Commoner in hills above 1000 m than in lowlands.

Bibliography. Amadon (1942), Bregulla (1992), Collar *et al.* (1994), Diamond (1975b), Diamond & Marshall (1976), Mayr (1945b), Parker (1968).

38. Red-chinned Lorikeet

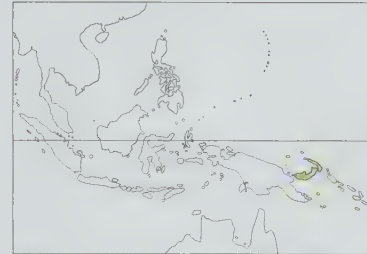
Charmosyna rubrigularis

French: Lori à menton rouge **German:** Rotkinnlori **Spanish:** Lori Barbirrojo

Taxonomy. *Trichoglossus rubrigularis* P. L. Sclater, 1881, New Britain.

Monotypic.

Distribution. New Britain and New Ireland, and also Karkar I off NE coast of New Guinea.



Descriptive notes. 17 cm; 31-40 g. Green, brighter below, with reddish orange bill and red chin, orange-red legs; ear-coverts slightly bluish with pale green streaks; underside of flight-feathers greyish brown with broad yellow mid-stripe; underside of tail greyish brown but red basally and broadly tipped yellow. Immature has less red on chin, shorter tail.

Habitat. Canopy of hill and montane forest above 500 m, although generally much commoner from 1000-1500 m, and on Karkar rare below 2000 m.

Food and Feeding. Noted feeding on inflorescences of a native palm; paste in stomachs ap-

parently composed of nectar and macerated flowers.

Breeding. No clear information; evidence from Karkar suggests no activity May-Jun.

Movements. Apparently sedentary.

Status and Conservation. Not globally threatened. CITES II. A BirdLife "restricted-range" species. Common to abundant.

Bibliography. Beehler (1978a), Beehler *et al.* (1986), Coates (1985), Diamond & LeCroy (1979), Eastwood (1995c), Finch (1981), Finch & McKean (1987), Gilliard & LeCroy (1967a), Greensmith (1975), Rand & Gilliard (1967).

39. Meek's Lorikeet

Charmosyna meeki

French: Lori de Meek **German:** Salomonenlori **Spanish:** Lori de Meek

Taxonomy. *Hypocharmosyna meeki* Rothschild and Hartert, 1901, Kolombangara, Solomon Islands.

Monotypic.

Distribution. Elevated Solomon Is, including Bougainville.



Descriptive notes. 16 cm; 21-32 g. Green, bright below, duller olive on wings and tail; bill and legs orange; crown faintly tinged greyish; ear-coverts and sides of neck show light green streaking on dark; mantle tinged brown; yellowish white band on underside of secondaries; tail yellow below. Immature has shorter tail, paler bill with brownish markings near base.

Habitat. Canopy of foothill and montane mist forest, 300-1500 m, even extending into stunted cloud forest at 1700 m; on Santa Isabel present at 900-1000 m, on Kolombangara only common from 1300 m, and on Guadalcanal not

found below 1000 m. Birds on Kolombangara observed to move downslope in day to forage, sometimes to coast.

Food and Feeding. Blossoms of *Syzygium*, *Metrosideros*, *Mearnsia* and coconuts recorded; also soft fruit and berries.

Breeding. Only nest known, containing small young, was in a large clump of moss on tree trunk 6 m above ground in stunted moss forest at 1550 m on Kolombangara, in Aug.

Movements. Described as rather nomadic on Bougainville; possibly so at higher altitudes on all islands.

Status and Conservation. Not globally threatened. CITES II. A BirdLife "restricted-range" species. On summit of Kolombangara, one of three most abundant bird species. Although generally in small parties, birds congregate in larger numbers at blossoming trees.

Bibliography. Buckingham *et al.* (1995), Cain & Galbraith (1956), Coates (1985), Dahl (1986), Hadden (1981), Mayr (1945b), Schodde (1977), Webb (1992).

40. Blue-fronted Lorikeet

Charmosyna toxopei

French: Lori de Buru **German:** Burulori **Spanish:** Lori de Buru

Other common names: Buru Lorikeet

Taxonomy. *Hypocharmosyna toxopei* Siebers, 1930, Buru.

Monotypic.

Distribution. Buru in S Moluccas.



Descriptive notes. 16 cm. Green above, yellowish green on breast; bill and legs orange; forehead green, forecrown pale blue; yellow band across underside of secondaries; underside of tail yellowish, red basally. Female has reduced blue on crown, stronger band on secondaries. Immature darker and duller.

Habitat. Probably the canopy of montane forest, the type series coming from 850-1000 m; however, it may in fact be a lowland forest bird.

Food and Feeding. Unrecorded but certainly nectar and pollen.

Breeding. No information.

Movements. No information.

Status and Conservation. **VULNERABLE.** CITES II. A BirdLife "restricted-range" species. Extremely poorly known. Originally described from snared birds brought to camp, the species has not certainly been recorded since: observations in 1980 suggesting the species was fairly common have been ascribed instead to *C. placensis*, although it now appears that the latter does not occur on Buru. Four lorikeets seen in 1989 could not be unequivocally identified, but were probably *toxopei*. If it is a lowland or nomadic bird it could be highly threatened by deforestation.

Bibliography. Andrew (1992), Anon. (1996e), Coates & Bishop (1997), Collar & Andrew (1988), Collar *et al.* (1994), Jepson (1993), Marsden *et al.* (1997), Poulsen & Purniassa (1996), Robson (1990a), Siebers (1930), Smiet (1985), Sujatnika & Jepson (1995), Sujatnika *et al.* (1995), Wheatley (1996), White & Bruce (1986).

41. Striated Lorikeet

Charmosyna multistriata

French: Lori strié

German: Streifenlori

Spanish: Lori Estriado

Other common names: Streaked/Yellow-streaked Lorikeet

Taxonomy. *Charmosynopsis multistriata* Rothschild, 1911, upper Setekwa River, New Guinea. Monotypic.

Distribution. C New Guinea on S slope of Central Ranges, from Snow Mts E into Chimbu Province.



Descriptive notes. 18 cm. Green, darker and plain above, paler and with fine yellow streaking below, this being lighter and somewhat whiter on face, becoming heavier and yellower on breast to belly; small vent patch red; hindcrown mid-brown with paler and darker flecks; eye red to brown, bill bluish above, yellowish orange below and on tip; legs grey. Immature has darker head, duller streaking.

Habitat. Foothill and lower montane forest, from lowlands at 80 m up to 1800 m.

Food and Feeding. Flowers of canopy trees and epiphytes, including inflorescences of *Dimorphanthera* and *Poikilospermum*.

Breeding. No information.

Movements. Possibly nomadic: birds in E of range appeared in mixed nectarivore flocks at peak of flowering usually Mar-Jul.

Status and Conservation. Not globally threatened. CITES II. Currently considered near-threatened. A BirdLife "restricted-range" species. Little known and poorly recorded but, although described as rare, evidently still secure. Fairly common in Ok Tedi area in WC Papua New Guinea.

Bibliography. Andrew (1992), Anon. (1994a, 1994b), Beehler *et al.* (1986), Coates (1985), Coates & Lindgren (1978), Collar *et al.* (1994), Gregory (1995a, 1995b), Mack & Wright (1996), Paulik & Kruszona (1991), Rand (1938, 1942a), Rand & Gilliard (1967), Sujatnika *et al.* (1995).

42. Pygmy Lorikeet

Charmosyna wilhelminae

French: Lori de Wilhelmina

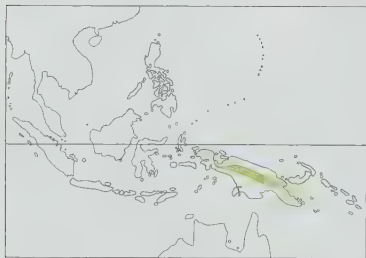
German: Elfenlori

Spanish: Lori Pigmeo

Other common names: Wilhelmina's/Pygmy Streaked Lorikeet

Taxonomy. *Trichoglossus wilhelminae* A. B. Meyer, 1874, west coast of Geelvink Bay. Monotypic.

Distribution. W, C & E New Guinea from Vogelkop E to Owen Stanley Range.



Descriptive notes. 13 cm. Green above, yellowish green below; mid- to hindcrown purple with blue streaks; hindneck stained brownish; thin yellow streaks on breast; underwing-coverts and broad band on underside of flight-feathers red; lower back red, rump cobalt; underside of tail red basally; bill yellowish orange; legs grey. Female lacks red on rump. Immature lacks crown and breast streaks.

Habitat. Canopy of mountain forest and edges, moss forest, adjacent savanna woodlands, generally 1000-2200 m although often lower.

Food and Feeding. Pollen and nectar; re-

corded trees include eucalypts and *Castanopsis* oaks, and inflorescences of *Elaeocarpus*.

Breeding. No information.

Movements. Appears to show some nomadism in response to flowering of certain trees, and regular appearance in the period May-Nov occurs at 220 m near Port Moresby. In one upland area, only recorded at peak flowering times.

Status and Conservation. Not globally threatened. CITES II. Generally uncommon but easily overlooked; usually singly or in pairs.

Bibliography. Andrew (1992), Anon. (1994a), Beehler (1978b), Beehler, Burg *et al.* (1994), Beehler, Pratt & Zimmerman (1986), Clapp (1979a), Coates (1985), Diamond (1972a), Gregory (1995a, 1995b), Mayr & Rand (1937), Rand & Gilliard (1967).

43. Red-fronted Lorikeet

Charmosyna rubronotata

French: Lori à front rouge

German: Rotstirnlori

Spanish: Lori Frentirrojo

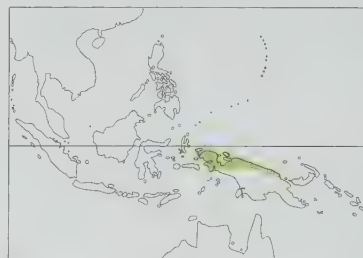
Other common names: Red-spotted/Red-fronted Blue-eared Lorikeet

Taxonomy. *Coriphilus rubronotatus* Wallace, 1862, Salawati and the north-western extremity of New Guinea.

Two subspecies recognized.

Subspecies and Distribution.

C. r. rubronotata (Wallace, 1862) - Salawati I and N New Guinea from Vogelkop to Adelbert Mts.
C. r. kordoana (A. B. Meyer, 1874) - Biak I.



Descriptive notes. 17 cm; 30-35 g. Green above, yellowish green below; forehead and sides of breast red, as are underwing-coverts, uppertail-coverts and base of underside of tail; ear-coverts violet streaked blue; flanks and variable band across underside of secondaries yellow; underside of tail dusky yellowish; bill and legs reddish. Female lacks red on forehead, breast and underwing-coverts; ear-coverts green streaked yellow. Immature undescribed. Race *kordoana* has more, paler red on crown, bluer ear-coverts.

Habitat. Canopy of secondary forest and coconut plantations along the coastline and inland hill forest up to 900 m, being confined to mid-montane forest where lowlands occupied by *C. placensis*.

Food and Feeding. No certain information, but feeding in tall flowering trees observed and reportedly at coconut blossoms.

Breeding. No information.

Movements. No information.

Status and Conservation. Not globally threatened. CITES II. Common in places, but generally not as abundant as sympatric congeners.

Bibliography. Andrew (1992), Beehler *et al.* (1986), Buckell (1994), Coates (1985), Cooke (1991b, 1993), Greensmith (1975), Mayr & Meyer de Schauensee (1939a), Pearson (1975b), Rand & Gilliard (1967), Ripley (1964), Sweeney (1997c).

44. Red-flanked Lorikeet

Charmosyna placensis

French: Lori coquet

German: Schönlori

Spanish: Lori Flanquirojo

Other common names: Blue-eared/Yellow-fronted/Yellow-fronted Blue-eared/Lowland Lorikeet

Taxonomy. *Psittacus placensis* Temminck, 1834, Utanata River, New Guinea.

Proposed race *occidentalis* included in nominate. Five subspecies recognized.

Subspecies and Distribution.

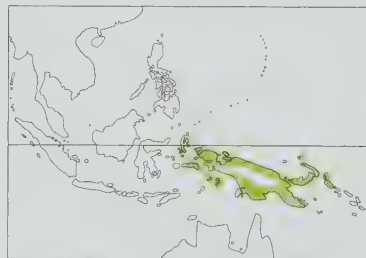
C. p. intensior (Kinnear, 1928) - N Moluccas and Gebe (W Papuan Is).

C. p. placensis (Temminck, 1834) - S Moluccas and Aru Is, and through S New Guinea to Gulf of Papua.

C. p. ornata Mayr, 1940 - W Papuan Is except Gebe, and N side of W Irian Jaya.

C. p. subplacensis (P. L. Slater, 1876) - NC New Guinea eastwards.

C. p. pallidior (Rothschild & Hartert, 1905) - Bismarck Archipelago to Bougainville.



Descriptive notes. 15-17 cm; 25-48 g. Generally green, yellowish on forehead; facial patch red, ear-coverts blue, sides of breast, flanks and underwing-coverts red, with yellow band across underside of flight-feathers; rump patch dark blue; tail green above, broadly tipped yellow and with subterminal red area in centre, yellow below; bill red, legs orange-red. Female lacks red and blue, and has ear-coverts bluish black streaked yellow, and green forehead. Immature like female, but male has some red. Race *intensior* slightly larger, darker blue on rump; *ornata* has more extensive red on throat, and is slightly darker green, with larger blue rump;

subplacensis without blue rump; *pallidior* like previous race but paler and perhaps brighter.

Habitat. Forest, especially mangroves; also savanna woodland, tall secondary growth, coastal *Casuarina* groves, coconut and sago plantations, riverside palm and eucalypts, and open cultivated areas. Generally reported from lowlands, below 250 m in Halmahera and Kai Is, with some records up to 1400 m; however, recently found up to 800 m on Halmahera, with highest densities above 700 m.

Food and Feeding. Apparently mainly or exclusively flowers and their nectar and pollen, including *Erythrina indica*, *Schefflera*, *Syzygium*, *Melicope*, *Poikilospermum*, *Dimorphanthera* and *Cocos nucifera*. One observation of birds apparently ingesting lichen and moss off trunks, branches and epiphytes.

Breeding. Jun-Nov, possibly much more extended, with birds seen at nest cavities in Feb and Apr. Nest in hole excavated by birds usually in arboreal termitarium or, sometimes, staghorn fern or moss clump. Eggs 2 (once), and 2 fledglings observed.

Movements. Observations on Halmahera suggest birds apparently travelling long distances in search of flowers.

Status and Conservation. Not globally threatened. CITES II. Generally common, and sometimes abundant e.g. in Bismarck Archipelago. Not a popular target of traders, mainly because most of the birds taken die before reaching the traders! Density of 30 birds/km² estimated in one area of SE New Guinea, and likewise on Halmahera.

Bibliography. Andrew (1992), Beehler (1978b), Beehler *et al.* (1986), Bell (1982), Bowler & Taylor (1989), Campbell (1981), Coates (1985), Coates & Bishop (1997), Cooke (1991a), Diamond (1972a), Finch & McKean (1987), Gilliard & LeCroy (1967a), Gregory (1995a, 1995b), Hadden (1981), Heron (1975), Hoogerwerf (1964a), Linsley (1995), Mack & Wright (1996), MacKinnon *et al.* (1995), Mayr & Rand (1937), Mees (1982a), Rand (1942b), Rand & Gilliard (1967), Ripley (1964), Schodde (1977), Smiet (1985), White & Bruce (1986).

45. New Caledonian Lorikeet

Charmosyna diadema

French: Lori à diadème

German: Diademlori

Spanish: Lori Diadema

Taxonomy. *Psitteuteles diadema* J. Verreaux and Des Murs, 1860, New Caledonia.

Monotypic.

Distribution. New Caledonia.

Descriptive notes. 19 cm. Only known from females, which are green with orange bill and legs, blue crown and yellow face; vague bluish tinge to lower thighs; red vent and base of lateral tail feathers, yellow underside of tail.



there is no explanation for the species's rarity.

Bibliography. Bregulla (1993), Collar & Andrew (1988), Collar *et al.* (1994), Dahl (1986), Greenway, J.C. (1967), Hannecart (1988), Hannecart & Létocart (1983), Low (1994b), Mayr (1945b), Sarasin (1913), Stokes (1980).

46. Red-throated Lorikeet

Charmosyna amabilis

French: Lori à gorge rouge

German: Rothörschen

Spanish: Lori Gorgirrojo

Taxonomy. *Trichoglossus (Glossopsitta) amabilis* E.P. Ramsay, 1877. Ovalau, Fiji Group, S. S. Islands.

Habitat. Forest, including by report the rain-forest—open *Melaleuca* woodland ecotone, also scrubland and perhaps cloud forest.

Food and Feeding. No information.

Breeding. No information.

Movements. No information.

Status and Conservation. ENDANGERED. CITES II. A BirdLife "restricted-range" species. The species is known from two specimens collected in 1859, reports published in 1913, and local albeit tenuous evidence in 1976. Cloud forest on Mt Panié, Mt Humboldt and the Massif de Kouakoué have been suggested as places worth searching for survivors, but

Formerly listed as *C. aureicincta*, a name described in the same year but now relegated to a synonym. Monotypic.

Distribution. Fiji, on Viti Levu, Vanua Levu, Ovalau and Taveuni.



Descriptive notes. 18 cm. Bright green, with orange bill and red area from lores to upper breast, latter thinly bordered yellow; thighs red, legs orange; tail tipped yellow, and yellowish below. Immature has only faint yellow on breast, and thighs greyish.

Habitat. In Habits upland rain forest at 120-1000 m, usually above 500 m, keeping to the canopy.

Food and Feeding. Known to take nectar, pollen and fruit.

Breeding. No information.

Movements. Presumably resident, but described as nomadic in search of flowering

trees.

Status and Conservation. VULNERABLE. CITES II. A BirdLife "restricted-range" species. Fairly common in at least one area of interior Viti Levu and widespread on Taveuni, 1973, though possibly extinct on Ovalau. Recently, however, it is reported as rare, and that the only confirmed records this century have been from Viti Levu, where recently only small flocks of up to six birds have been seen. The cause of the decline on or loss from other islands is not known but may be predation by black rats (*Rattus rattus*).

Bibliography. Clunie (1984), Collar *et al.* (1994), Dahl (1986), Fisher & Longmore (1995), Forshaw (1971a), Gorman (1975), Holyoak (1979), Low (1994b), Mayr (1945b), Pratt *et al.* (1987), Watling (1982a).



47. Duchess Lorikeet

Charmosyna margarethae

French: Lori de Margaret

German: Margarethenlori

Spanish: Lori de Margarita

Taxonomy. *Charmosyna margarethae* Tristram, 1879, Makira Harbour, San Cristobal, Solomon Islands. Monotypic.

Distribution. Solomon Is, including Bougainville.



Descriptive notes. 20 cm; 40-60 g. Mid- to hindcrown blackish, rest of head, throat and nape red; complete yellow ring, bordered on both sides by dull black, from breast onto sides of neck and upper back; vent green; tail red tipped yellow; upper back and wings green; lower back and rump olive green, red at sides; bill and legs orange. Female has yellow at sides of rump. Immature has less defined yellow ring, unbordered above, with dark scaling to body feathers.

Habitat. Forests, second growth and coconut plantations from sea-level into lower mountains up to 1350 m, apparently more numerous away

from lowlands though considered most frequent at 100-600 m. On Kolombangara and San Cristobal lower densities found in all lowland habitats including primary forest, highest numbers on San Cristobal being at 500-700 m.

Food and Feeding. Pollen, nectar and blossoms, and soft fruit, especially epiphytic *Schefflera*.

Breeding. Display by male to female observed, Jan; gonads of collected birds inactive in Jul, although locals report breeding at that time.

Movements. No information, but fluctuations in abundance would seem likely in response to phenology of flowering trees.

Status and Conservation. Not globally threatened. CITES II. Currently considered near-threatened. A BirdLife "restricted-range" species. Widespread and fairly common at least on Kolombangara, Guadalcanal and Bougainville; uncommon on Santa Isabel; common on San Cristobal, possibly owing to absence of *C. meeki*.

Bibliography. Buckingham *et al.* (1995), Cain & Galbraith (1956), Coates (1985), Collar *et al.* (1994), Dahl (1986), Diamond (1975a), Greensmith (1975), Hadden (1981), Mayr (1945b), Rothschild & Hartert (1901), Schodde (1977), Webb (1992, 1997).

48. Fairy Lorikeet

Charmosyna pulchella

French: Lori féérique

German: Goldstrichellori

Spanish: Lori Lindo

Other common names: Little Red Lorikeet

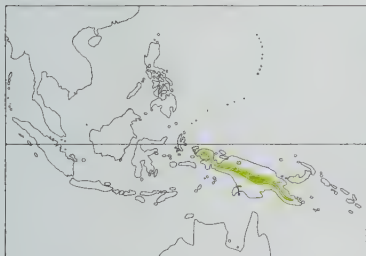
Taxonomy. *Charmosyna pulchella* G. R. Gray, 1859, Manokwari, New Guinea.

Populations of C and E formerly considered separate race, *bella*. Two subspecies recognized.

Subspecies and Distribution.

C. p. rothschildi (Hartert, 1930) - Cyclops Mts and adjacent ranges, N Irian Jaya.

C. p. pulchella G. R. Gray, 1859 - mountains of New Guinea from Vogelkop to Huon Peninsula and E Papua New Guinea.



Descriptive notes. 18-19 cm; 24-35 g. Red on head, nape and underparts except for purplish black patch on mid- to hindcrown, thin yellow streaks on breast, dusky thighs; wings green with red and green underwing-coverts and dark flight-feathers; rump patch dull blue, sometimes washed green; uppertail-coverts and proximal half of uppertail green, distal half red becoming yellow, underside yellow; bill and legs orange-red. Female has yellow patches on sides of rump. Immature has green in dark crown patch and thighs, and on breast, yellow band across underside of flight-feathers. Race *rothschildi* has crown patch joined to rear edge

of dark supercilium, large green breast patch, dull purplish belly, no blue rump; female more extensively green below.

Habitat. Forest, forest edge and secondary areas in lower hills and mid-montane areas, variably occurring at altitudes of 500-1800 m, sometimes in lowlands.

Food and Feeding. Feeds at canopy flowers presumably on pollen and nectar; large *Melicope* trees appear important, and inflorescences of *Elaeocarpus* and *Syzygium*.

Breeding. Dec-Jan, Apr. Nest a hole excavated in the base of an epiphyte. In captivity: 1-2 eggs; incubation apparently 25 days; nestling period 2 months.

Movements. Birds wander nomadically into lowlands at times, and presence in one area of uplands directly related to flowering of *Melicope*.

Status and Conservation. Not globally threatened. CITES II. Scarce in some areas, common in others, and locally abundant. Levels of trade, almost all out of Indonesia, generally low.

Bibliography. Andrew (1992), Beehler (1978b), Beehler *et al.* (1986), Brook (1914), Coates (1985), Diamond (1972a), Finch (1979b), Gilliard (1950a), Gilliard & LeCroy (1961), Greenway (1935), Gregory (1995a, 1995b), Harrison & Holyoak (1970), Inskipp *et al.* (1988), Mack & Wright (1996), Majnep & Bulmer (1977), Mayr & Rand (1937), Pratt (1982), Rand (1942b), Rand & Gilliard (1967), Ripley (1964).

49. Josephine's Lorikeet

Charmosyna josefinae

French: Lori de Joséphine

German: Josefinenlori

Spanish: Lori de Josefina

Other common names: Josephine's Lory

Taxonomy. *Trichoglossus josefinae* Finsch, 1873, Arfak Mountains.

Three subspecies recognized.

Subspecies and Distribution.

C. j. josefinae (Finsch, 1873) - W New Guinea from Vogelkop to Snow Mts.

C. j. cyclopum Hartert, 1930 - NC New Guinea in Cyclops Mts.

C. j. sepikiana Neumann, 1922 - C New Guinea from R Sepik and Western Highlands E to Mt Bosavi.



Descriptive notes. 23-25 cm. Plumage extensively red, with orange bill and legs, blue-streaked black patch from behind eye over rear crown and nape; black lower belly, flanks and thighs; olive green mantle and wings, but red underwing-coverts; small dull blue rump patch; outer tail feathers proximally green, distally yellow, tail tipped yellow and underside all yellow. Female has yellow patch on upper rump. Immature has green or blue tinge in black. Race *sepikiana* has grey instead of blue in crown, more black on belly; *cyclopum* largely lacks any blue crown streaking, and is only faintly dusky on belly.

Habitat. In habits forest, forest edge and partly cultivated land, generally at middle elevations, 760-1770 m.

Food and Feeding. Nectar, pollen and flower buds, taken in canopy trees and mid-storey epiphytes; a climbing vine with large white flowers noted to be important.

Breeding. Bird in breeding condition taken in Feb; no other information.

Movements. No information, but possibly nomadic.

Status and Conservation. Not globally threatened. CITES II. Considered to be generally sparse and local throughout most parts of range, although assessments may be biased by unobtrusive behaviour. Forest habitat not threatened at present, but likely to be affected in future; trade probably not a threat, although 697 were exported in 1986, mostly from Indonesia, and 459 in 1987, thereafter becoming much lower.

Bibliography. Andrew (1992), Anon. (1993, 1994a), Beehler *et al.* (1986), Campbell (1981), Clayton (1993), Coates (1985), Coates & Lindgren (1978), Gregory (1995a, 1995b), Low (1991g), Pagel & Greven (1990), Rand (1942b), Rand & Gilliard (1967), Ripley (1964), Rothschild (1931), de Ruiter (1993b).

50. Papuan Lorikeet

Charmosyna papou

French: Lori papou

German: Papualori

Spanish: Lori Rabilargo

Other common names: Fairy/Stella's Lorikeet, Papuan Lory

Taxonomy. *Psittacus Papou* Scopoli, 1786, Arfak.

Four subspecies recognized.

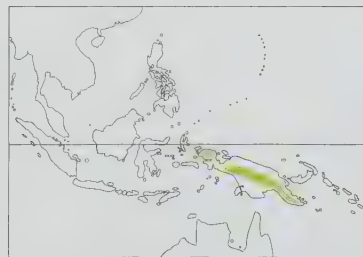
Subspecies and Distribution.

C. p. papou (Scopoli, 1786) - Vogelkop (W New Guinea).

C. p. goliathina Rothschild & Hartert, 1911 - Weyland Mts (Irian Jaya) E to Eastern Highlands of Papua New Guinea.

C. p. wahnesei Rothschild, 1906 - Huon Peninsula.

C. p. stellae A. B. Meyer, 1886 - Herzog Mts to Owen Stanley Range.



Descriptive notes. 36-42 cm; 74-113 g. Upper body and underparts red with blue band across mid-crown bordered black on hindcrown, black line on hindneck, broad black band on belly and thighs, yellow patch on side of breast and flank behind thigh; mantle, wings and tail dark green, with primary tips somewhat elongate and very long (20-25 cm) central tail streamers, tipped yellow; underwing-coverts red, underside of flight-feathers blackish; lower back and sides of rump red, central rump blue shading to green on uppertail-coverts; bill and legs orange. Female has yellow patch on lower back.

Immature duller, with less elongate wing and tail feathers. Race *goliathina* replaces yellow patch on breast with red, on flank with black, central tail feathers yellow for most of extended length; *stellae* similar but tail tips more orange; *wahnesei* has yellow breastband and green tinge to black on belly. All forms except nominate said to have a common (generally higher-altitude) melanistic morph, in which red is replaced by black and dark green; mixed red/black forms also occur.

Habitat. Montane forest at altitudes of 1500-3500 m, including disturbed *Nothofagus*-*Podocarpus* forest.

Food and Feeding. Recorded feeding on blossoms, flower buds, pollen, soft fruit of *Schefflera* and other trees, and also small seeds; has also been reported to consume insects (possibly ingested accidentally).

Breeding. Pair with enlarged gonads in Aug; young birds seen Oct-Nov. In captivity: 2 eggs; incubation lasting 3 weeks; nestling period around 7 weeks.

Movements. Numbers appear to build up and decline with local food supply, suggesting a degree of local nomadism.

Status and Conservation. Not globally threatened. CITES II. Reported to be fairly common throughout wide range; skins greatly prized as head decorations by highland people and are much traded.

Bibliography. Andrew (1992), Beehler (1978b), Beehler *et al.* (1986), Brook (1910), Coates (1985), Cooke (1995a), Diamond (1972a), Frith & Frith (1992), Gilliard & LeCroy (1961), Gregory (1995a, 1995b), Hadden (1975), Low (1973), Mayr & Gilliard (1954), Mayr & Rand (1937), Pratt (1982), Rand (1942b), Rand & Gilliard (1967), Ripley (1964), Rothschild (1931), Russell (1981a), Sims (1956).

Genus *OREOPSITTACUS* Salvadori, 1877

51. Plum-faced Lorikeet

Oreopsittacus arfaki

French: Lori bridé **German:** Arfaklori **Spanish:** Lori Bigotudo
Other common names: Whiskered Lorikeet

Taxonomy. *Trichoglossus (Charmosyna) Arfaki* A. B. Meyer, 1874, Arfak Mountains, 3500 feet (c. 1060 m), New Guinea.

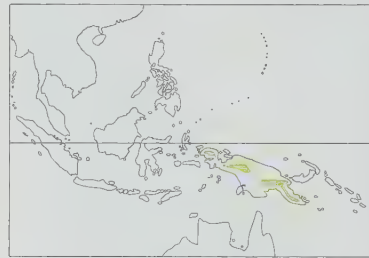
Three subspecies recognized.

Subspecies and Distribution.

O. a. arfaki (A. B. Meyer, 1874) - Vogelkop (W Irian Jaya).

O. a. major Ogilvie-Grant, 1914 - Snow Mts (C Irian Jaya).

O. a. grandis Ogilvie-Grant, 1895 - C mountain ridge of Papua New Guinea.



Descriptive notes. 15-17 cm; 16-26 g. Bill black, entire crown above line through eye red; face below eye plum purple, with double string of white flecks from lores under eye to ear-coverts; postocular area adjoining sides of neck, nape, upperparts and tail dark green; primaries blue; underparts yellowish green, but sides of breast and underwing-coverts red, belly and lower flanks orange-red, yellow on sides of undertail-coverts; yellow band across undersides of secondaries; tail tipped reddish pink, underside all reddish. Female has no red on head. Immature similar, with black edges on upperparts, facial pattern less obvious. Race *major* larger,

with more extensive red tip to tail; *grandis* similar but lacks orange-red on belly and flanks.

Habitat. Montane mist forest at 2000-3750 m, including disturbed *Nothofagus-Podocarpus* forest. Occasionally found as low as 1000 m.

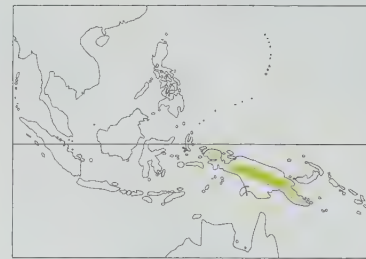
Food and Feeding. Nectar and perhaps pollen of *Dimorphanthera cf. cornuta*, flowers and fruits of *Schefflera*, berries; noted to feed not only in the crowns of trees but also on small fruits on lower growth inside forest; usually in pairs.

Breeding. Mating display observed in Jun, and breeding condition birds in Aug-Oct. No other information.

Movements. No information.

Status and Conservation. Not globally threatened. CITES II. Fairly common but difficult to observe. Regular around Tari Gap, Papua New Guinea.

Bibliography. Andrew (1992), Anon. (1994a), Beehler (1978b), Beehler *et al.* (1986), Coates (1985), Diamond (1972a), Frith & Frith (1992), Gilliard & LeCroy (1961), Gregory (1995a, 1995b), Hopkins (1992), Low (1997c), Majnep & Bulmer (1977), Mayr & Rand (1937), Rand (1942b), Rand & Gilliard (1967), Ripley (1964).



Descriptive notes. 21-23 cm; 41-62 g. Bill yellow; head olive green, shading to russet on hindcrown, with light yellow streaks on crown and dense pale greenish streaks on face below eye; back and wings green, but wings mostly red below; throat and centre of both breast and belly red; sides of breast to lower belly and vent light green; tail green above with outer feathers basally red, yellow-orange below and at tips. Immature duller with less red on underparts. Race *major* larger and paler, facial streaks yellow.

Habitat. Mid-montane (e.g. *Nothofagus-Podocarpus*) forest, edge, secondary growth

and clearings, chiefly 1560-2660 m; seems to prefer disturbed areas and groves of casuarinas in garden areas.

Food and Feeding. *Schefflera* fruits recorded, also other fruits, berries, small hard seeds, caterpillars and lerps; also flowers of tall eucalypts and of weeds at ground level.

Breeding. Sept-Jan on circumstantial basis; however, evidence for around Jun, with juvenile and post-breeding male in late Aug. Nest reportedly in hole in tree, with 2 eggs (2 eggs in captivity).

Movements. No information.

Status and Conservation. Not globally threatened. CITES II. Common; one of few mid-montane birds to have profited from human clearance of forest, being numerous in cleared areas around villages.

Bibliography. Andrew (1992), Beehler (1978b), Beehler *et al.* (1986), Bell (1984b), Campbell (1979, 1981), Coates (1985), Diamond, J.M. (1972a, 1985), Gilliard & LeCroy (1961), Gregory (1995a, 1995b), Majnep & Bulmer (1977), Mayr & Gilliard (1954), Mayr & Rand (1937), Peckover & Filewood (1976), Rand & Gilliard (1967), Ripley (1964), Rothschild (1931), Sims (1956), Tavistock (1950), Thurlow (1989).

53. Orange-billed Lorikeet

Neopsittacus pullicauda

French: Lori émeraude **German:** Orangeschnabel-Berglori **Spanish:** Lori Montano Chico
Other common names: Emerald Lorikeet

Taxonomy. *Neopsittacus pullicauda* Hartert, 1896, Victoria District, Owen Stanley Range, New Guinea.

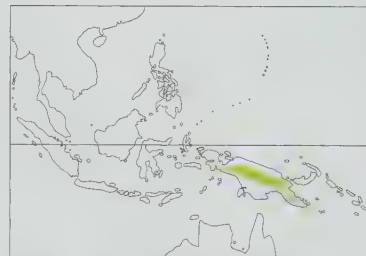
Three subspecies recognized.

Subspecies and Distribution.

N. p. alpinus Ogilvie-Grant, 1914 - WC New Guinea from Snow Mts to area around Mt Capella.

N. p. socialis Mayr, 1931 - Huon Peninsula and Herzog Mts, EC Papua New Guinea.

N. p. pullicauda Hartert, 1896 - E New Guinea from area around Mt Capella to Owen Stanley Range.



Descriptive notes. 18 cm; 25-40 g. Very similar to *N. musschenbroekii* but smaller, bill orange, no olive tinge and narrower yellow streaking on crown; red more continuous on underparts. Immature duller, with reduced red, brownish bill. Race *socialis* like nominate but darker; *alpinus* has orange breast.

Habitat. Canopy of mossy cloud forest and adjacent cleared areas on high mountains up to 3800 m, descending, albeit rarely, as low as 1600 m.

Food and Feeding. Somewhat more nectarivorous than congener (although both may consume flowers more than sympatric *Oreo-*

psittacus arfaki and *Charmosyna papou*), but also takes seed cones of gymnosperm *Papuacedrus papuanus*, and fleshy berries of *Sericolea pullei*.

Breeding. Oct. Nest reportedly in hole in tall tree, with 2 eggs.

Movements. No information, but record from as low as 800 m indicates occasional vagrancy from high elevations, and regular or irregular vertical movements may be usual.

Status and Conservation. Not globally threatened. CITES II. Generally common and little affected by habitat loss or trade.

Bibliography. Andrew (1992), Beehler (1978b), Beehler *et al.* (1986), Bell (1984b), Clear (1993), Coates (1985), Diamond (1972a), Gilliard & LeCroy (1961), Gregory (1995a, 1995b), Hopkins (1992), Junge (1953), Majnep & Bulmer (1977), Mayr & Gilliard (1954), Mayr & Rand (1937), Peckover & Filewood (1976), Rand (1942b), Rand & Gilliard (1967), Ripley (1964).

Genus *NEOPSITTACUS* Salvadori, 1875

52. Yellow-billed Lorikeet

Neopsittacus musschenbroekii

French: Lori de Musschenbroek **German:** Gelbschnabel-Berglori **Spanish:** Lori Montano Grande
Other common names: Musschenbroek's Lorikeet

Taxonomy. *Nanodes Musschenbroekii* Schlegel, 1873, Hatam, Arfak, New Guinea.

Two subspecies recognized.

Subspecies and Distribution.

N. m. musschenbroekii (Schlegel, 1873) - Vogelkop (Irian Jaya).

N. m. major Neumann, 1924 - C New Guinea from Snow Mts E to Huon Peninsula and Owen Stanley Range.



PLATE 33

PLATE 33

Family PSITTACIDAE (PARROTS) SPECIES ACCOUNTS

Subfamily PSITTACINAE

Tribe PSITTRICHADINI

Genus *PSITTRICHAS* Lesson, 1831

54. Pesquet's Parrot

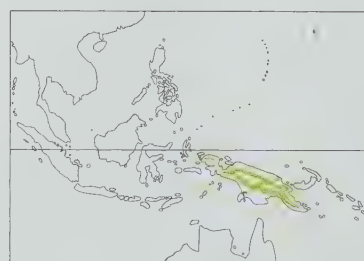
Psittrichas fulgidus

French: Psittrichas de Pesquet **German:** Borstenkopf **Spanish:** Loro Aguileño
Other common names: Vulturine/Bare-headed Parrot

Taxonomy. *Banksianus fulgidus* Lesson, 1830, New Guinea. Relationships uncertain and taxonomic position remains somewhat controversial; has been associated with Loriinae, but also shows affinities with Nestorini (see page 282). Monotypic.

Distribution. Mountains of New Guinea.

Descriptive notes. 46 cm; 690-800 g. Bill, bare face to behind eye and head and upperparts black, with vague red patch behind eye, dull red uppertail-coverts, and red median and greater wing-coverts and outer secondaries; throat to upper belly black with greyish edging, making scaled effect; belly to undertail-coverts red; tail black. Female lacks red patch behind eye. Immature is duller red.



Habitat. Primary and tall secondary forest in foothills and lower mountains from 600 to 1200 m, occasionally ranging into lowlands and almost to 2000 m.

Food and Feeding. Appears to be a specialist on fruits of certain figs (*Ficus*), in particular an unidentified species with a hard pericarp, but other soft fruit also taken, including mangoes and climbing pandans. Blossoms and nectar, and flowers of *Freyinetia*, also reported.

Breeding. Breeding condition birds in Feb. Apr, May; fledged juveniles in Dec. Nest apparently unreported. Usual brood size appears

to be 2. In captivity: 2 eggs; incubation lasting 27 or 31 days.

Movements. No information.

Status and Conservation. **VULNERABLE.** CITES II. Marked variations in local abundance, with flocks of up to 20 recorded. Although still not uncommon in remote areas, numbers have declined drastically on account of hunting pressure, and the species has disappeared from forest near human habitation. Skins are used as "bride" price in the highlands, costing around K20 in markets, and are even more valuable than bird-of-paradise plumes; however, birds are also used for food. Deforestation is also afflicting the species and to some extent trapping for the bird trade.

Bibliography. Andrew (1992), Beehler (1978b), Beehler *et al.* (1986), Bell (1969a), Bishop (1987), Cher (1994), Coates (1985), Collar *et al.* (1994), Courtney (1997a), Cunningham (1990), Diamond (1972a), Dyck (1977), Gregory (1995a, 1995b), Homberger (1981), de Jager (1976a, 1976b), Low (1990b, 1991i, 1992e, 1994b), Mack & Wright (1996), Mayr (1937), Ogilvie-Grant (1915), Rand (1942a, 1942b), Rand & Gilliard (1967), Schmid (1993), Schodde & Hitchcock (1968), Thurslund & Paul (1987).

Tribe NESTORINI

Genus *NESTOR* Lesson, 1830

55. Kea

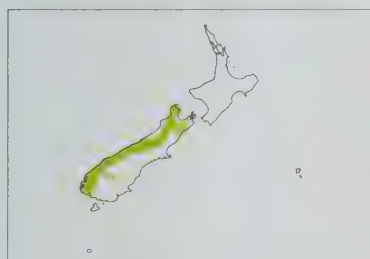
Nestor notabilis

French: Nestor kéa

German: Kea

Spanish: Kea

Taxonomy. *Nestor notabilis* Gould, 1856, Murihiku District, South Island, New Zealand. Monotypic.
Distribution. Mountains of South I, New Zealand.



Descriptive notes. 48 cm; adult mean 922 g. Brown head and underparts with indistinct blackish edges to feathers, shading to dull bronze green on back and wings with stronger black scaling; outer webs of primaries dull blue; underwing-coverts reddish orange with yellow barring and notching to bases of undersides of flight-feathers; lower back to uppertail-coverts dull reddish, scaled black; tail above bronze green with dark subterminal bar, below dull yellow with dark subterminal bar and buffy tips. Female slightly smaller, with shorter, less curved bill. Immature has yellowish crown, yellow cere.

Habitat. Wooded valleys and *Nothofagus* forests bordering subalpine scrublands at 600-2000 m, occupying the upper scrub and grassland zones in summer, moving higher for berries in autumn before descending below the timberline in winter.

Food and Feeding. Changes through year. In Jan birds feed on flowering mountain flax (*Phormium colensoi*), rata (*Metrosideros*) and other trees and shrubs, then berries of snow totara (*Podocarpus nivalis*) from late Jan to coming of snow. Other non-seasonally grouped foods include fruits of *Coprosma ciliata*, *Cyathodes fraseri*, *Muehlenbeckia axillaris*, *Pentachondra pumila* and *Astelia nervosa*, and leaves of *Senecio scorzonoides*. Birds also take flesh and bone-marrow from carcasses and scavenge on rubbish dumps.

Breeding. Chiefly Jul-Jan, although recorded at all times of year except late autumn. Nest in crevice under rocks or in tree roots, or in hollow log. Eggs 2-4; incubation lasts 3-4 weeks; nestling period 13 weeks. Young males appear to disperse from natal area, while young females remain; however, mortality in male birds appears to be very much higher, since despite polygynous mating system there generally appears to be a surplus of females, not males. As few as 10% of adult males may breed in any given year, this in part due to polygyny by dominant male birds.

Movements. Juveniles form wandering flocks in autumn.

Status and Conservation. Not globally threatened. CITES II. Currently considered near-threatened. A BirdLife "restricted-range" species. Total population estimated very crudely at 1000-5000 birds around 1985, based on an assumed and unsupported density of 2-10 birds/84 km², but other evidence suggesting 30-5 birds/84 km² indicates possibly 15,000 birds, 1992; however, if Keas show higher densities around car-parks, refuse dumps and ski resorts then this figure may be far too high. Once seriously persecuted in the belief that birds kill sheep, with 6819 killed in the years 1943-1946; now established that attacks on living sheep are extremely rare and only involve already injured or diseased animals.

Bibliography. Anderson (1986), Bolton (1997), Bond & Diamond (1992), Bond *et al.* (1991), Chambers (1989), Clarke (1970), Cunningham, A. (1974), Cunningham, J.M. (1948), Dawson (1959), Diamond & Bond (1991), Falla *et al.* (1981), Fingland (1994), Jackson (1960, 1962a, 1962b, 1963b, 1969), Keller (1975), Kinsky (1970), Kirk *et al.* (1993), Liedek (1995), McCaskill (1954), Peat (1994), Potts (1976, 1977), Riney *et al.* (1959), Robertson (1985), Schmidt (1971), Smith, G.A. (1996), Soper (1976), Tebbich *et al.* (1996), Williams (1975), Zeigler (1975).

56. Kaka

Nestor meridionalis

French: Nestor superbe

German: Kaka

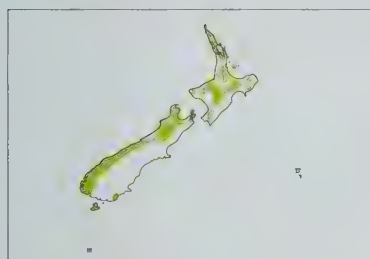
Spanish: Kaka

Taxonomy. *Psittacus meridionalis* J. F. Gmelin, 1788, Dusky Sound, South Island, New Zealand. Probably formed superspecies with *N. productus*, formerly of Norfolk I and nearby Philip I, a species which became extinct in mid-19th century. Two subspecies recognized.

Subspecies and Distribution.

N. m. septentrionalis Lorenz, 1896 - North I and some offshore islands.

N. m. meridionalis (J. F. Gmelin, 1788) - South I, Stewart I and larger offshore islands.



Descriptive notes. 45 cm; average 550 g. Forehead to nape whitish, lightly edged buff; face brown with broad pinkish flecks that become yellow on ear-coverts; colours of head shade to olive-grey on nape and dull rust-red, lightly scaled black, on upper mantle, latter colour extending onto lower neck, flanks, belly, undertail-coverts, rump and uppertail-coverts; throat and breast, lower mantle, upper back and wings scaled brownish grey. Female has shorter and less curved bill. Immature similar to adult with pale eye-ring. Race *septentrionalis* duller, darker and smaller.

Habitat. Remaining areas of lowland and mid-altitude native forest.

Food and Feeding. Fruits, including *Podocarpus ferrugineus*, *Beilschmiedia tarairi*, berries, seeds (notably of *Agathis australis*), flowers, buds, nectar and invertebrates. Sap of *Pseudopanax colensoi*, *Griselinia littoralis*, *Nothofagus solandri*, *Metrosideros umbellata* and, on Stewart I, *Dacrydium cupressinum* important in winter, along with winter-flowering puriri (*Vitex lucens*) and kohekohe (*Dysoxylum spectabile*). Honeydew from the scale insect *Ultracoelostoma assimile* is critically important in *Nothofagus* forest in summer and autumn, while larvae of the longhorn beetle *Ochrocydus huttoni* are protein-rich but expensive in energy to obtain. Recorded feeding in kiwifruit orchard, Sept, and on flax flowers, Jan.

Breeding. Sept-Mar. Nest in large hollow in limb or trunk, also in hollow base of cabbage tree; on Kapiti commonly below 3 m, and the preferred trees being *Melictytus ramiflorus* and *Dysoxylum spectabile*. Eggs 2-5; incubation c. 3 weeks; nestling period 9-10 weeks; young dependent on food provision by parents for 4-5 months. Hatching success fairly low (56% on Kapiti in successive seasons 1988-1989); reproductive rate apparently very low, with low numbers of breeding attempts per year.

Movements. Birds are partly nomadic, sometimes appearing in areas from which they have been absent for some time. In winter birds appear to wander into more open country.

Status and Conservation. VULNERABLE. CITES II. The species has suffered chronic decline owing to habitat clearance, and mainland populations face further declines owing to predation by introduced stoats and rats, competition for honeydew from introduced wasps and possums (which appears to have a disastrous impact on breeding performance), and continuing habitat clearance. Its numbers remain high only on offshore islands such as Little Barrier, Codfish and Kapiti.

Bibliography. Beggs & Wilson (1987, 1988, 1991), Chambers (1989), Collar *et al.* (1994), Dawson (1959), Falla *et al.* (1981), Fingland (1994), Imber (1967), Jackson (1963a, 1971), Kinsky (1970), Kirk *et al.* (1993), Liedek (1997), Matthews (1980), Moorhouse (1991), Moorhouse & Greene (1995), O'Donnell (1993), O'Donnell & Dilks (1989, 1993), O'Donnell & Rasch (1991), Roberts (1953), Robertson (1985), Sibson (1947), Skipworth (1965), St. Paul (1977), Turbott (1952, 1990), Williams (1975).

Tribe STRIGOPINI

Genus *STRIGOPS* G. R. Gray, 1845

57. Kakapo

Strigops habroptilus

French: Strigops kakapo

German: Kakapo

Spanish: Kakapo

Taxonomy. *Strigops habroptilus* G. R. Gray, 1845, Dusky Sound, South Island. Monotypic.

Distribution. New Zealand, formerly on North I, South I and Stewart I, with subfossil remains from Chatham Is; persisted until 1989 in Milford District of Fiordland in South I, and until 1992 on SE Stewart I. Now survives as introduced populations on Codfish I, Maud I and Little Barrier I.



Descriptive notes. 64 cm; 950-3000 g. Green above, mottled with blackish chevrons and brownish blotches, tail patterned greenish yellow, brown and black; yellowish below, with notches and bars of buff and green; superciliary stripe lemon yellow; forehead, face and ear-coverts yellowish brown with elongate rictal bristles. Female no different in size but less heavy. Immature duller, face browner.

Habitat. Primarily mossy *Nothofagus* forests, particularly where adjacent to open ground along river flats or the subalpine scrub belt bordering snow tussock *Danthonia* meadows. Birds shelter by day in low trees, rock crevices, burrows amidst roots or under shrubs, becoming active at night.

Food and Feeding. Versatile and opportunistic vegetarians with different seasonal diets: fruits, berries, nuts, seeds, green shoots, leaf buds, roots, rhizomes, tubers, bark, stems, moss, fungi. On Stewart I main food plants are *Blechnum* fern fronds, followed by *Dracophyllum*, *Gahnia* and *Astelia*, plus *Lycopodium*, *Schizaea*, *Cyathodes*, *Olearia*, *Thelymitra*, *Oreobolus* and *Carex*, with new growth and developing foliage targeted in spring and summer, and subterranean parts of plants from autumn through to early spring; fruit of *Fuchsia* reportedly important, and crops of some birds were filled with moss. Absence of reproductive behaviour in certain years is linked to erratic availability of certain food, once thought to be tussock and grass seed, but apparently (on Stewart I and Codfish I) autumn mast production of podocarps. Even chicks in first weeks of life are not fed animal food, but *Agathis australis* leaves apparently important and fruits and leaves of rimu (*Dacrydium cupressinum*).

Breeding. Dec-Feb, once as late as May. Birds form no pair-bond and males lek vocally to attract females at night, but in some years all activity is suspended. Nest is a burrow in large crevice between rocks or tree roots. Eggs 1-2, rarely 3, evidently with long intervals between laying of first and second eggs; incubation c. 30 days; nestling period c. 3½ months. Females have been known to breed at 9 and 11 years old, but may be able to do so earlier.

Movements. Sedentary (flightless).

Status and Conservation. CRITICALLY ENDANGERED. CITES I. In steady retreat since human occupation of New Zealand, present species appears to have begun its catastrophic decline when European settlement resulted in the establishment of alien predators, notably the stoat (*Mustela erminea*) and black rat (*Rattus rattus*), although on Stewart I the principal cause of decline was feral cats, and it is now judged that even Polynesian rats (*R. exulans*) are serious threats to nesting birds. From 1987 to 1992 all 37 remaining birds on Stewart I were translocated to the predator-free islands of Codfish, Maud and Mana (failing to establish on Mana), so that with a population already transferred to Little Barrier I the species is now extinct throughout its natural range. Supplementary feeding induced breeding in four out of five years on Little Barrier, and by Mar 1994 the total population was a minimum 47 birds, 30 males and 17 females; however, only eight of latter were proven breeders, some 87% of remaining birds were then over 14 years old, and there was continuing high chick mortality due to starvation and predation. By Jan 1997 total population was up to 50 birds, including 19 females. First breeding on Codfish I in 1992, but of six chicks hatched only one survived, largely due to failure of rimu crop; surviving chick was hand-reared, and might shortly be old enough to breed. Total of four chicks hatched on Codfish I in early 1997, the first breeding anywhere since 1993.

Bibliography. Able (1993), Best (1980, 1984), Best & Powlesland (1985), Cemmick & Veitch (1987), Chambers (1989), Clout & Craig (1995), Collar & Andrew (1988), Collar *et al.* (1994), Dawson (1959, 1960, 1962), Falla *et al.* (1981), Fingland (1994), Gray (1977), Hall-Jones (1960), Karl & Best (1982), King (1978/79), Kirk *et al.* (1993), Livezey (1992), Lloyd & Powlesland (1994), Low (1994b), McMurtry (1993), Medway (1986), Merton (1975, 1976, 1977, 1997a, 1997b), Merton *et al.* (1984), Moorhouse & Powlesland (1991), Morris (1977), Morris & Smith (1988), Pain (1990), Powlesland & Lloyd (1994), Powlesland, Lloyd *et al.* (1992), Powlesland, Roberts *et al.* (1995), Rauzon (1986), Robertson (1985), Russ (1978), Shepard & Spitzer (1985), Sibley (1994), Sibson (1982), Soper (1976), Trewick (1996), Triggs *et al.* (1989), Williams (1956, 1975), Williams & Given (1981).

ssp keiensis

ssp chloroxantha

58

♂

ssp misoriensis

♀

59

ssp geelvinkiana

♂

ssp beccarii

60

ssp harterti

ssp pusio

inches 2
cm 5

PLATE 34

ssp proxima

61

♀

♂

ssp finschii

62

ssp viridifrons

♂

♂

♀

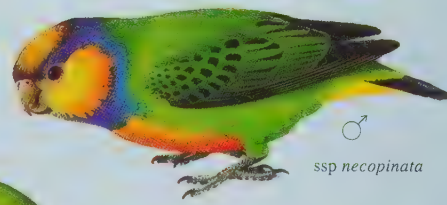
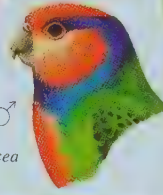
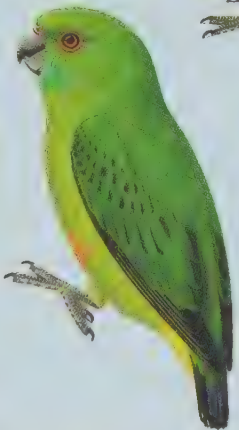
ssp bruijnii

63

♂

ssp rosea

ssp meeki



ssp necopinata

ssp aolae

ssp diopthalma

♀

ssp marshalli

♀

♂

ssp aruensis

♂

ssp macleayana

♂

65

ssp coccineifrons

♂

ssp virago

♀

ssp coxeni

ssp inseparabilis

ssp suavissima

♂

♀

ssp guillemierii

♀

64

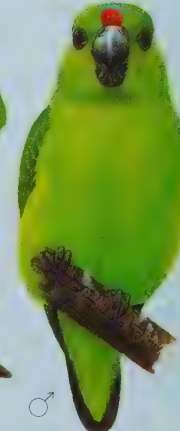
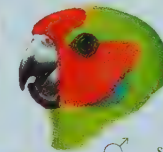
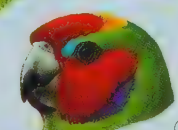
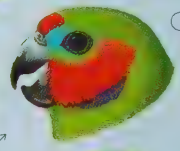
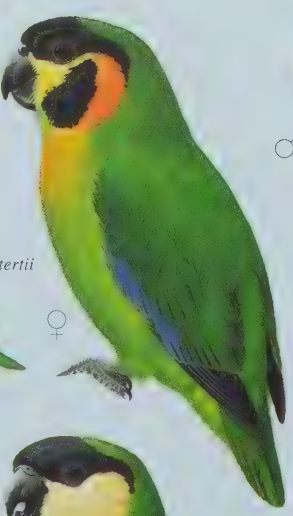
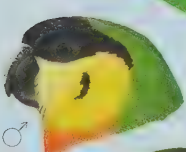
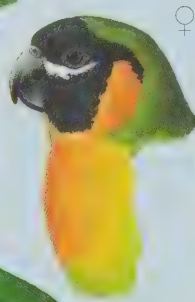
ssp amabilis

♂

♀

ssp nigrifrons

ssp fuscifrons



Tribe MICROPSITTINI

Genus *MICROPSITTA* Lesson, 1831

58. Yellow-capped Pygmy-parrot

Micropsitta keiensis

French: Micropsitte pygmée

Spanish: Microloro de las Kai

German: Gelbkappen-Spechtpapagei

Taxonomy. *Nasiterna keiensis* Salvadori, 1875. Kai Islands.

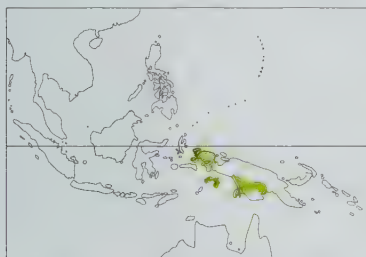
Forms a superspecies with *M. geelvinkiana* and *M. pusio*. Three subspecies recognized.

Subspecies and Distribution.

M. k. keiensis (Salvadori, 1875) - Kai Is and Aru Is.

M. k. chloroxantha Oberholser, 1917 - W Papuan Is, Vogelkop and Onin Peninsula, W Irian Jaya.

M. k. viridipectus (Rothschild, 1911) - S New Guinea.



Descriptive notes. 9 cm; 11-14 g. Most of plumage green, but crown dusky yellow, shading to green at rear, and upper face ochre, shading to green below. No apparent sex or age differences. Race *viridipectus* supposedly darker than nominate; *chloroxantha* has variable orange-red midline down lower breast and belly.

Habitat. Lowland and hill forest, coconut plantations, mangroves, nypa forest, even visiting trees in villages; usually in understorey. On Kai Is ranges to 250 m.

Food and Feeding. Presumably fungus and lichen taken by bark-gleaning on trunks of flowering trees, particularly figs; most stomach contents are an indeterminate paste, but small seeds found.

Breeding. Sept-Mar on basis of nestling in Oct, breeding condition male in Nov, nest with young in Mar. Nest in hollow excavated in arboreal termitarium 3-4 m from ground. In one nest there were 6 adults as well as 2 nestlings, since the nest was also used for roosting by young from previous broods.

Movements. No information.

Status and Conservation. Not globally threatened. CITES II. Very common on Kai Is, scarce on Aru Is (apparently naturally), moderately common throughout W Papuan Is.

Bibliography. Andrew (1992), Beehler *et al.* (1986), Bergman (1960), Coates (1985), Coates & Bishop (1997), Erftemeijer *et al.* (1991), Hartert (1901), Hoogerwerf (1971), Mayr & Rand (1937), Rand & Gilliard (1967), Ripley (1964), White & Bruce (1986).

59. Geelvink Pygmy-parrot

Micropsitta geelvinkiana

French: Micropsitte de Geelvink

Spanish: Microloro de Geelvink

German: Geelvinkspechtpapagei

Taxonomy. *Nasiterna pygmaea geelvinkiana* Schlegel, 1873. Mafor.

Forms a superspecies with *M. keiensis* and *M. pusio*. Two subspecies recognized.

Subspecies and Distribution.

M. g. geelvinkiana (Schlegel, 1873) - Numfor I, Geelvink Bay.

M. g. misoriensis (Salvadori, 1875) - Biak I, Geelvink Bay.



Descriptive notes. 9 cm; 13-17 g. Most of plumage green, but crown and face dark brownish blue, bluer on throat, with yellow arc on hindcrown, broad orange yellow centre to underparts from breast to undertail-coverts. Female has green underparts and duller face; lacks yellow on crown. Immature undescribed. Race *misoriensis* has head brown.

Habitat. Primary and secondary forest, including regrowth as low as 4 m high, woodland edge adjacent native gardens. Recorded only up to 150 m.

Food and Feeding. Probably lichen and fungus off bark, as in other *Micropsitta*; crushed

seeds were in the stomach of a collected bird.

Breeding. Bird with slightly developed gonads in Dec; nest construction in Jun, and 2 nestlings also in Jun. Nest in arboreal termitarium.

Movements. No information.

Status and Conservation. Not globally threatened. CITES II. Currently considered near-threatened. A BirdLife "restricted-range" species. Well distributed in good numbers in lowland secondary and remnant primary forest patches on Biak, and throughout adjacent Supiori (off NW Biak).

Bibliography. Andrew (1992), Beehler *et al.* (1986), Collar *et al.* (1994), Mayr & Meyer de Schauensee (1939a), Rand & Gilliard (1967), Rothschild *et al.* (1932), Sujatnika *et al.* (1995).

60. Buff-faced Pygmy-parrot

Micropsitta pusio

French: Micropsitte à tête fauve

German: Braunstirn-Spechtpapagei

Spanish: Microloro Pusio

Taxonomy. *Nasiterna pusio* P. L. Slater, 1866, Solomon Islands; error = Duke of York Island.

Forms a superspecies with *M. keiensis* and *M. geelvinkiana*. All races very similar and validity has been questioned, as characters are not obvious and provenance of some material currently in doubt; species may be better considered monotypic. Four subspecies tentatively recognized.

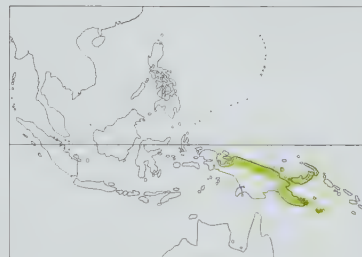
Subspecies and Distribution.

M. p. beccarii (Salvadori, 1876) - N New Guinea from W Geelvink Bay to Kumusi R, and islands of Manam, Karkar, Bagabag and Rook.

M. p. pusio (P. L. Slater, 1866) - SE New Guinea and Bismarck Archipelago.

M. p. harterti Mayr, 1940 - Fergusson I (D'Entrecasteaux Is).

M. p. stresemanni Hartert, 1926 - Misima I and Tagula I (Louisiade Archipelago).



Descriptive notes. 8 cm; 10-15 g. Generally green, more yellowish on underparts; forehead and face buff-ochre, sometimes with yellowish superciliary stripe; central crown to nape deep blue; back and wings green, with black spotting on median wing-coverts; undertail-coverts yellow; tail blue centrally, black laterally with small yellow spots at tips. Female has paler face and crown. Immature has green crown. Race *harterti* greener below, throat washed blue; *stresemanni* like *harterti* but yellower below; *beccarii* darker, with duller brown face.

Habitat. Lowland and floodplain gallery forest, tall secondary growth and trees in clearings, sometimes dense savanna and coconut stands, up to 800 m, although only common up to 400 m.

Food and Feeding. Lichen, bark fungus, and probably termites; insect remains, tiny black seeds, yellow fruit flesh and flowers in stomachs.

Breeding. Dec-May. Nest in hole excavated in arboreal termitarium, in one case that of *Microcerotermes biro* about 2 m above ground on the trunk of a small tree in secondary forest. Eggs 2-3.

Movements. Wandering groups noted in extreme E of range, but whether there is true nomadism or birds simply range over large home ranges over several weeks is not known.

Status and Conservation. Not globally threatened. CITES II. Very uncommon or local on Sepik R, but common in Owen Stanley Range foothills, SE Papua New Guinea, where density estimated at 20 birds/km². Common, Bismarcks and Bagabag. Abundance may be underestimated owing to unobtrusive habits, e.g. infrequently seen near Port Moresby yet calls suggest it to be most abundant parrot in area.

Bibliography. Andrew (1992), Bailey (1992a), Baptista (1990), Beehler (1978b), Beehler *et al.* (1986), Bell (1982, 1984b), Coates (1985), Diamond & LeCroy (1979), Finch & McKean (1987), Gilliard & LeCroy (1966, 1967a), Mack & Wright (1996), Mayr & Rand (1937), Pearson (1975b), Rand & Gilliard (1967), Ripley (1964), Shanahan (1969).

61. Yellow-breasted Pygmy-parrot

Micropsitta meeki

French: Micropsitte de Meek

German: Meekspechtpapagei

Spanish: Microloro de Meek

Other common names: Meek's Pygmy-parrot

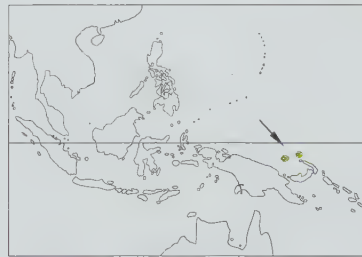
Taxonomy. *Micropsitta meeki* Rothschild and Hartert, 1914, Manus, Admiralty Islands.

Two subspecies recognized.

Subspecies and Distribution.

M. m. meeki Rothschild & Hartert, 1914 - Admiralty Is.

M. m. proxima Rothschild & Hartert, 1924 - St Matthias and Squally Is.



Descriptive notes. 10 cm. Head dusky grey-brown with light barring, usually with indistinct yellow superciliary; nape and underparts yellow with weak brown edging, giving vague scaled effect; back and wings green, with black spotting on median wing-coverts; tail green above, grey and yellow below. Immature undescribed. Race *proxima* has paler head with distinct yellow superciliary.

Habitat. Primary and degraded forest, apparently commoner in latter.

Food and Feeding. Seen pecking at small warty protuberances, apparently fungi, on smooth-barked tree; also seen nibbling lichen

off tree-trunk.

Breeding. One nest reported to have been found in arboreal termitarium, only 25 cm above ground; however, the source of this record is unclear. No further information available.

Movements. No information.

Status and Conservation. Not globally threatened. CITES II. A BirdLife "restricted-range" species. Common on Manus and Lou.

Bibliography. Coates (1985), Dutton & Newman (1991), Eastwood (1995a), Greensmith (1975), Gregory (1995c), Hartert (1926b), Sibley (1951).

62. Green Pygmy-parrot

Micropsitta finschii

French: Micropsitte de Finsch

German: Salomonenspechtpapagei

Spanish: Microloro de Finsch

Other common names: Finsch's Pygmy-parrot

Taxonomy. *Nasiterna finschii* E. P. Ramsay, 1881, San Cristobal, Solomon Islands.

Five subspecies recognized.

Subspecies and Distribution.

M. f. viridifrons (Rothschild & Hartert, 1899) - New Hanover, New Ireland and Lihir Is.

M. f. nanina (Tristram, 1891) - N Solomon Is of Bougainville, Choiseul and Santa Isabel.
M. f. tristrami (Rothschild & Hartert, 1902) - W Solomon Is of Vella Lavella, Gizo, Kolombangara, New Georgia, Rubiana and Rendova.
M. f. aolae (Ogilvie-Grant, 1888) - EC Solomon Is in Russell Is, Guadalcanal and Malaita.
M. f. finschii (E. P. Ramsay, 1881) - SE Solomon Is of Uki, San Cristóbal and Rennell.



Descriptive notes. 8-9 cm; 12-18 g. Green throughout, paler on underparts; vague blue around base of lower mandible; black spotting on median wing-coverts; belly spot orange-red; undertail-coverts yellow; tail greenish blue centrally, black laterally. Female has pink around base of lower mandible, no belly spot. Immature similar. Race *aolae* darker above, with blue patch on crown and no belly spot; *tristrami* like nominate without belly spot; *nanina* like *aolae* but with less blue on crown; *viridifrons* like *aolae* with more blue on crown extending onto sides of head, sometimes also with red belly spot.

Habitat. Chiefly primary forest but also second growth, shade trees and trees in clearings between 500-1000 m, possibly lower, but in S Bougainville largely confined to subcanopy and substage of unmosed primary forest with an open understorey at 600-750 m; in E Solomons generally occurs up to cloud forest where replaced by *M. bruijnii*, but different altitude limits at which birds become rare noted for Kolombangara (490 m) and San Cristóbal (900 m). Occasionally frequents coconut groves and casuarinas.

Food and Feeding. Birds feed on relatively clear trunks and limbs of trees, pecking off bark and pieces of fungus and lichen; remains of small scaled insects found alongside indeterminate vegetable matter in stomachs. Some birds noted apparently following slow-moving mixed bird flocks.

Breeding. Mar-Apr. Guadalcanal. Reported to nest in low arboreal or terrestrial termite mound.

Movements. No information.

Status and Conservation. Not globally threatened. CITES II. A BirdLife "restricted-range" species. Fairly common. Bismarcks, and throughout most of Solomons although affected by forest loss on Guadalcanal. Abundant within narrow elevation range, S Bougainville. On Kolombangara densities much higher in lowland primary forest than secondary growth.

Bibliography. Bradley & Wolff (1956), Bregulla (1976), Buckingham *et al.* (1995), Cain & Galbraith (1956), Coates (1985), Finch & McKean (1987), Greensmith (1975), Hadden (1981), Hindwood (1959), Mayr (1945b), Nicholson (1974), Schodde (1977), Sibley (1951), Webb (1992, 1997).

63. Red-breasted Pygmy-parrot

Micropsitta bruijnii

French: Micropsitte de Bruijn **German:** Rotbrust-Spechtpapagei **Spanish:** Microloro Pechirrojo
Other common names: Rose-breasted/Mountain Pygmy-parrot

Taxonomy. *Nasiterna bruijnii* Salvadori, 1875. Mount Arfak.

A distinct yellow-crowned form has been noted in Ok Tedi region of Papua New Guinea. Race *pileata* known in museums from only three male skins, none of which shows great differences from the variation present in nominate race. Four subspecies currently recognized.

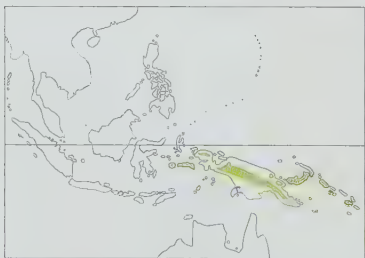
Subspecies and Distribution.

M. b. pileata Mayr, 1940 - Buru and Seram, in S Moluccas.

M. b. bruijnii (Salvadori, 1875) - mountains of New Guinea from Vogelkop in W to Owen Stanley Range in E.

M. b. necopinata Hartert, 1925 - New Britain and New Ireland.

M. b. rosea Mayr, 1940 - Bougainville, Guadalcanal and Kolombangara, in Solomon Is.



Descriptive notes. 8-9 cm; 12-16 g. Forehead rusty shading to dull blue on hind-crown, nape, sides of neck and frontal half-collar; face yellow shading redder on ear-coverts; breast to undertail-coverts orange-red; back and flanks green; wings green with black spotting on median wing-coverts; tail blue centrally, black laterally. Female has whitish buff forehead and face, blue crown, rest green with yellow underparts. Immature like female with whitish forehead and face. Race *pileata* claimed to have deeper and more extended rust-red on crown, although this is not readily apparent on the only skins; *necopinata* has deep brown

crown, yellowish in centre, with red-orange face and yellow undertail-coverts; *rosea* has crown reddish pink, face pinker than nominate.

Habitat. Canopy of dense hill forest at 700 m, cloud forest at 1300 m, moss forest at 2000 m; range generally 500-2300 m although seen in lowlands on Buru; also forest edge and *Albizia* shade trees in coffee plantations, occasionally in coffee plantations and riparian growth. Not found in moss forest. Kolombangara, although common in tall montane forest up to 1300 m.

Food and Feeding. Food gleaned methodically from on or under bark in upper branches of trees, sometimes with regular mechanical pecking action, but stomach contents usually indeterminate; fungus, lichen and moss have been observed being taken; white paste found in stomachs may be corollas of white-flowered *Schefflera*, which contain a great deal of nectar. Has been seen feeding on fruit and possibly also flowers and lichen in canopy of *Syzygium* tree.

Breeding. Dec-Apr. Nest is hole in dead stump or tree, 3-4 m from ground; one was apparently attended by a male and two females.

Movements. Probably nomadic, although in places possibly a regular migrant, e.g. reportedly an annual visitor to lowlands of Buru at the start of the dry season in Oct/Nov; thought nomadic on New Britain.

Status and Conservation. Not globally threatened. CITES II. Usually considered uncommon to rare on Seram and Buru, but easily overlooked. Widespread but local in New Guinea; undescribed form at Ok Tedi common, with 650 counted flying NE in Nov 1992. Common locally in Bismarck Archipelago; common on Kolombangara.

Bibliography. Andrew (1992), Beehler (1978a, 1978b), Beehler *et al.* (1986), Bishop (1987), Buckingham *et al.* (1995), Coates (1985), Coates & Bishop (1997), Diamond (1972a), Finch & McKean (1987), Gilliard & LeCroy (1961, 1967a), Gregory (1994, 1995a, 1995b), Hadden (1981), Hyndman & Frodin (1980), Jepsen (1993), Mayr (1945b), Mayr & Rand (1937), Pratt (1982), Rand (1942b), Rand & Gilliard (1967), Schodde (1977), Siebers (1930), White & Bruce (1986).

Tribe CYCLOPSITTACINI

Genus *CYCLOPSITTA* Reichenbach, 1850

64. Orange-breasted Fig-parrot

Cyclopsitta gulelmitertii

French: Psittacule à poitrine orange

German: Orangebrust-Zwergpapagei

Spanish: Lorito Pechinaranja

Other common names: William's Fig-parrot

Taxonomy. *Psittacula gulelmi* III Schlegel, 1866. Salawati and New Guinea. Controversy concerning application of correct genus name; junior synonym *Opopsitta* sometimes erroneously used. Seven subspecies recognized.

Subspecies and Distribution.

C. g. melanogenia (Schlegel, 1866) - Aru Is.

C. g. gulelmitertii (Schlegel, 1866) - Salawati and W Vogelkop, New Guinea.

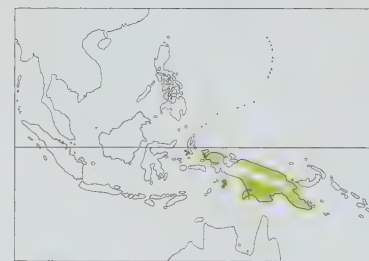
C. g. nigrifrons (Reichenow, 1891) - N New Guinea.

C. g. ramuensis (Neumann, 1915) - NE New Guinea around R Ramu.

C. g. fuscifrons (Salvadori, 1876) - S New Guinea.

C. g. amabilis (Reichenow, 1891) - Huon Peninsula eastwards, Papua New Guinea.

C. g. suavisissima P. L. Sclater, 1876 - SE Papua New Guinea.



Descriptive notes. 13 cm; 27-34 g. Dark green above; forehead to below and behind eye dark blackish blue; lores, throat and sides of head pale yellow; breast and upper belly orange; lower belly to vent yellowish green; flight-feathers dark blue. Female has orange ear-coverts, dark border to yellow cheeks, and greenish breast. Immature not clearly described. Race *nigrifrons* replaces blue with black; *ramuensis* has variable mixture of blue and black in crown; *amabilis* has blue suffusion in black crown, male having orange breast and upper belly, female with face to upper belly pale cream; *suavisissima* like nominate but forehead darker, yellow area whitish with large black patch from chin to ear-coverts; *fuscifrons* like *suavisissima* but forehead brown; *melanogenia* female has more greenish breast.

Habitat. Rain- and monsoon forest, gallery and savanna woodland, *Melaleuca* swamp forest, partly cleared areas, in lowlands and hills up to 1100 m.

Food and Feeding. Seeds of figs (*Ficus*) probably main staple, but also seeds of *Glochidion*, whose fruits are broken apart, and *Acacia auriculaeformis*; also apparently the inflorescences of *Poikilospermum*.

Breeding. Dec-Jun, but nest cavity visits and advertisement in Sept-Oct, when begging juveniles also noted. Nest in hole excavated in arboreal termitarium, with two or more active nests found in the same mound.

Movements. Sedentary.

Status and Conservation. Not globally threatened. CITES II. Common at Crater Mountain and other parts of S of range, where at one site density estimated at 30 birds/km², and at Ok Tedi in WC Papua New Guinea (subspecies unknown), but local in N of range, and some subspecies appear to be very rare.

Bibliography. Andrew (1992), Beehler *et al.* (1986), Bell (1982, 1984b), Bell & Coates (1979), Bellchambers *et al.* (1994), Coates (1985), Diamond (1972a), Gregory (1995a, 1995b), Mack & Wright (1996), Mayr & Rand (1937), Rand (1938), Rand & Gilliard (1967), Sweeney (1994e).

65. Double-eyed Fig-parrot

Cyclopsitta diophthalma

French: Psittacule double-œil

German: Rotwangen-Zwergpapagei

Spanish: Lorito Doblejojo

Other common names: Dwarf/Blue-faced/Red-faced/Two-eyed Fig-parrot

Taxonomy. *Psittacula diophthalma* Hombron and Jacquinot, 1841, southern coast of New Guinea = Triton Bay.

Controversy concerning application of correct genus name; junior synonym *Opopsitta* sometimes erroneously used. Race *coxeni* may be an incipient species. Eight subspecies recognized.

Subspecies and Distribution.

C. d. diophthalma (Hombron & Jacquinot, 1841) - W Papuan Is and W New Guinea.

C. d. aruensis (Schlegel, 1874) - Aru Is and extreme S New Guinea.

C. d. coccineifrons (Sharpe, 1882) - E New Guinea.

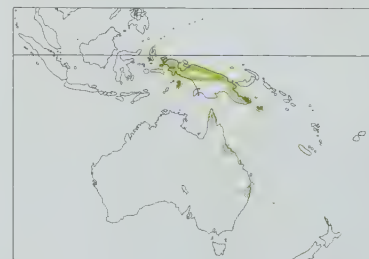
C. d. virago (Hartert, 1895) - Goodenough I and Fergusson I (D'Entrecasteaux Is).

C. d. inseparabilis (Hartert, 1898) - Tagula I (Louisiade Archipelago).

C. d. marshalli (Iredale, 1946) - extreme N Queensland.

C. d. nucleayana E. P. Ramsay, 1874 - NE Queensland.

C. d. coxeni Gould, 1867 - SE Queensland and NE New South Wales.



Descriptive notes. 13-16 cm; 25-56 g. Green above, yellowish green below; crown red shading to orange then green on hindcrown; area in front of eye pale blue shading above it to green; area from base of bill and chin back to ear-coverts red, bordered dark blue on lower ear-coverts; sides of breast and flanks yellow; some red on inner part of wing; flight-feathers dark bluish, with yellowish white band on underside of secondaries. Female has lower cheeks buffy pink. Immature like female. Race *coccineifrons* darker, more orange on crown; *aruensis* with blue on ear-coverts to chin, greenish tinge to blue in front of eye, little or

ange on crown; *virago* little blue on face; *inseparabilis* no blue or buff on cheeks; *marshalli* similar to *aruensis* but lacks green tinge; *macleayana* lacks red on lores, crown green; *coxeni* has virtually no red on crown, just a blue forehead, and broken orange-red-green facial pattern.

Habitat. Lowland and montane forest and edge, riverine and more open woodland, tall second growth, partly cleared areas with clumps of trees, mangroves, sometimes entering parks and gardens. Generally up to 1600 m, occasionally as high as 2000 m.

Food and Feeding. Fruits, particularly figs such as *Ficus eugenioides*, *F. destruans*, *F. hispida*, *F. ehretii*, *F. macrophylla* and *F. watkinsiana* (seeds rather than flesh being taken), but also e.g. *Croton*, *Elaeocarpus grandis*, *Trema orientalis*, *Alphitonia whitei*, berries, seeds, nectar (e.g. *Grevillea robusta*), bark or fungal growths, and insects.

Breeding. Variably recorded: Mar-May in New Guinea, but extending, e.g. breeding condition female at hole in Jun, or recurring later, e.g. Nov; Aug-Nov in Australia. Nest in hollow of high,

often emergent tree, or in rotten tree-trunk or dead limb. Eggs 2; in captivity, incubation period 18 days, nestling period 52 days or more.

Movements. Apparently nomadic at least in parts of range.

Status and Conservation. Not globally threatened. Race *coxeni* on CITES I; other forms on CITES II. Locally common, especially in lower reaches of altitudinal range; general sense of rarity probably related to difficulty of detection. Only race *coxeni* gives cause for concern owing to loss and fragmentation of habitat, although much of its breeding habitat is now in reserves.

Bibliography. Beehler *et al.* (1986), Blakers *et al.* (1984), Bourke & Austin (1947), Coates (1985), Diamond (1972a), Forshaw (1967, 1979, 1981a, 1981b), Garnett (1993), Gill (1970), Hiaso *et al.* (1994), Holmes (1990), Low (1994b), Mack & Wright (1996), Martindale (1985), Mayr & Gilliard (1954), McWhirter (1986a), Neufeld (1995), Rand & Gilliard (1967), Ripley (1964), Romer (1994), Spittall (1991), Symons (1993).



Genus *PSITTACULIROSTRIS*

J. E. & G. R. Gray, 1859

66. Large Fig-parrot

Psittaculirostris desmarestii

French: Psittacule de Desmarest **Spanish:** Lorito de Desmarest
German: Buntbrust-Zwergpapagei
Other common names: Golden-headed Fig-parrot, Desmarest's Fig-parrot

Taxonomy. *Psittacus Desmarestii* Desmarest, 1826. Manokwari, New Guinea.
Genus sometimes lumped into *Cyclopsitta* (or *Opopsitta*). Six subspecies recognized.
Subspecies and Distribution.

P. d. blythii (Wallace, 1864) - Misool, W Papuan Is.
P. d. occidentalis (Salvadori, 1875) - Batanta, Salawati and W Vogelkop.
P. d. desmarestii (Desmarest, 1826) - E Vogelkop.
P. d. intermedia (van Oort, 1909) - Onin Peninsula, Irian Jaya.
P. d. godmani (Ogilvie-Grant, 1911) - S New Guinea from SE Irian Jaya to R Fly.
P. d. cervicalis (Salvadori & D'Albertis, 1875) - R Fly E to extreme E New Guinea.

Descriptive notes. 18 cm; 108-126 g. Forehead red shading to orange on crown and nape; lores to below eye blue; face light green bordered by light blue breastband and broken orange-brown band; underparts yellowish green; back, wings and tail dull green, with innermost tertials edged orange; underwing bar pale yellow. Immature has crown dull yellow. Race *intermedia* has more orange crown; *occidentalis* deep yellow face; *blythii* like *occidentalis* but face brighter with no blue; *godmani* like *blythii* with yellow ear-covert feathers elongated, crown and nape orange-red with yellow band on hindneck; *cervicalis* similar with blue band on hindneck, darker blue band across breast.

Habitat. Lowland and low hill forest, partly cleared areas, groves of casuarinas, occasionally open savanna, extending rarely up to 1650 m.

Food and Feeding. Seeds of figs and partial consumption of hard pericarp of fig noted; and use of a fig species in which the fruit grows in clusters from the trunk.

Breeding. Female in breeding condition in Jul, male in Aug, and colony of nests being attended in Sept. Nest in cavity high in trunk or branch of large old tree.

Movements. No information.

Status and Conservation. Not globally threatened. CITES II. Conflicting reports exist of its general abundance, but it is generally uncommon and apparently local, and intolerant of serious habitat degradation. A total of 4475 birds were exported from Indonesia in the years 1985-1990, a level of trade which has been judged possibly to place the Irian Jaya populations at risk; commercial importation of the species into the EC from Indonesia was prohibited in Nov 1987.

Bibliography. Andrew (1992), Anon. (1993, 1994a), Beehler (1982), Beehler *et al.* (1986), Coates (1985), Diamond (1972a), Gregory (1995a, 1995b), Hoogerwerf (1971), Mayr & Meyer de Schauensee (1939a), Neufeld (1995), Rand (1942a), Rand & Gilliard (1967), Rothschild (1920), Sweeney (1993c), Tubb (1945), Wiseman (1988).

67. Edwards's Fig-parrot

Psittaculirostris edwardsii

French: Psittacule d'Edwards **German:** Edwardszwergpapagei **Spanish:** Lorito de Edwards

Taxonomy. *Cyclopsittacus Edwardsii* Oustalet, 1885, Kafu, New Guinea.
Genus sometimes lumped into *Cyclopsitta* (or *Opopsitta*). Monotypic.

Distribution. NC & NE New Guinea from Humboldt Bay E to Huon Peninsula.

Descriptive notes. 18 cm; 105 g. Forehead and mid-crown bright green, isolated by broad black line through eye to hindcrown and nape; elongated feathers of anterior face red, posterior (ear-coverts) yellow with some pale blue; broad band on upper breast blue-black; lower breast to belly red, with green flanks, thighs, vent and undertail-coverts; back, wings and tail dull green, with innermost tertials edged orange-red; underwing bar yellow. Female lacks red on breast. Immature like female with anterior face yellow.

Habitat. Lowland and hill forest and edge, also partly cleared land.

Food and Feeding. Figs are the only certainly recorded food; other reports are of fruits of casuarinas and other trees; birds sometimes feeding in large flocks.

Breeding. Apparent nest-site occupation observed, Jan-May; juvenile collected in Jul; courtship and nest prospecting in Oct. Presumed nest-sites were small holes high in tall trees.

Movements. No information.

Status and Conservation. Not globally threatened. CITES II. A BirdLife "restricted-range" species. Locally common to very common, with as many as 400 recorded in a foraging flock. A total of 2851 birds were exported by Indonesia in the period 1985-1990, a level of trade not judged to be

prejudicial to the security of this species; however, its commercial importation into the EC from Indonesia was prohibited in Nov 1987.

Bibliography. Andrew (1992), Anon. (1993), Bailey (1992a), Barnicoat (1995a), Beehler *et al.* (1986), Coates (1985), Diamond (1972a), Draffan (1977), Greensmith (1975), Neufeld (1995), Pearson (1975b), Rand & Gilliard (1967), Ripley (1964), Sujatnika *et al.* (1995).

68. Salvadori's Fig-parrot

Psittaculirostris salvadorii

French: Psittacule de Salvadori **German:** Salvadorizwergpapagei **Spanish:** Lorito de Salvadori
Other common names: Whiskered Fig-parrot

Taxonomy. *Cyclopsittacus Salvadorii* Oustalet, 1880, north coast of New Guinea between long. 136°30' and 137° E.

Genus sometimes lumped into *Cyclopsitta* (or *Opopsitta*). Monotypic.

Distribution. NW New Guinea from E shores of Geelvink Bay E to Cyclops Mts.



Descriptive notes. 19 cm; 118 g. Forehead bluish green shading to bright green crown, yellow on nape; elongated facial feathers golden yellow, blue behind eye; undersides yellowish green except for broad orange-red patch on breast; back, wings and tail dull green, with innermost tertials edged orange. Female has bluish crown, greenish yellow face, pale blue patch on breast. Immature duller than female.

Habitat. Lowland forest and edge, up to 400 m.

Food and Feeding. Seen attending a fruiting fig tree.

Breeding. Record of possible nest-site prospecting in hole in tree.

Movements. No information.

Status and Conservation. **VULNERABLE.** CITES II. A BirdLife "restricted-range" species. Locally common and parts of range are remote and inaccessible, but extensive logging and land clearance in the region, owing to Indonesia's transmigration policy, coupled with extensive trapping for the cagebird trade, are judged to be causing a rapid and substantial decline in numbers. However, a total of only 1582 birds was exported from Indonesia in the period 1985-1990, which was not judged to prejudice the security of the species; nevertheless, its commercial importation into the EC from Indonesia was prohibited in Jul 1987.

Bibliography. Andrew (1992), Anon. (1993), Beehler *et al.* (1986), Collar & Andrew (1988), Collar *et al.* (1994), Courtney (1997b), Diamond, J.M. (1985), Leli (1991), Neufeld (1995), Rand & Gilliard (1967), Smith (1977c), Sujatnika *et al.* (1995), Sweeney (1997c).

Genus *BOLBOPSITTACUS* Salvadori, 1891

69. Guaiabero

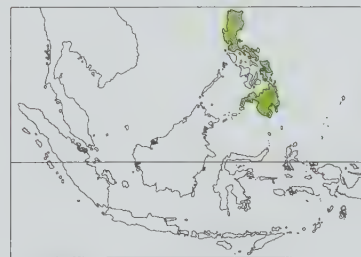
Bolbopsittacus lunulatus

French: Perruche lunulée **German:** Stummelschwanzpapagei **Spanish:** Lorito Guaiabero

Taxonomy. *Psittacus lunulatus* Scopoli, 1786, Luzon.
Four subspecies recognized.

Subspecies and Distribution.

B. l. lunulatus (Scopoli, 1786) - Luzon, N Philippines.
B. l. callainipictus Parkes, 1971 - Samar, EC Philippines.
B. l. intermedius Salvadori, 1891 - Leyte and Panaon, EC Philippines.
B. l. mindanensis (Steere, 1890) - Mindanao, SE Philippines.



Descriptive notes. 15 cm; 62-77 g. Green above, yellowish green below and on rump and uppertail-coverts; bill bluish grey; face and throat pale blue; narrow pale blue collar; bend of wing blue; pale yellow band across undersides of secondaries. Female has pale blue only on throat, lores and cheeks; has yellow collar and yellowish rump, both with small but noticeable black crescent markings. Immature like female, bill paler. Races differ mainly in general tone of coloration, and in tone and extent of blue on head and narrow collar.

Habitat. Forest and forest edge, secondary growth, clearings with scattered trees, orchards

and mangroves.

Food and Feeding. Fig seeds and fruit, fruits of vines and cultivated trees including guava, from which its name derives; forages along vines and limbs of trees. Generally found feeding below 1000 m.

Breeding. Starting to reach breeding condition in Mar.

Movements. No information.

Status and Conservation. Not globally threatened. CITES II. Usually considered fairly common throughout fairly limited range; regularly recorded at Angat Watershed Forest, in area of reservoir to serve Manila.

Bibliography. Amadon & Jewett (1946), Danielsen *et al.* (1994), Delacour & Mayr (1946), Dickinson *et al.* (1991), DuPont (1971), Gilliard (1950b), Goodman & Gonzales (1990), Hachisuka (1934), McGregor (1909-1910), Parkes (1971b), Rand & Rabor (1960), Sargeant (1992), Smith, G.A. (1981), Sweeney (1994a, 1995c), Wheatley (1996).

Tribe PLATYCERCINI

Genus *PROSOPEIA* Bonaparte, 1854

70. Crimson Shining-parrot

Prosopeia splendens

French: Perruche écarlate **German:** Fidschisittich **Spanish:** Papagayo Escarlata
Other common names: Crimson Musk-parrot

Taxonomy. *Platycercus splendens* Peale, 1848, Peale's River, Viti Levu, Fiji Islands. Usually considered conspecific with *P. tabuensis*, but may be closer to *P. personata*. Monotypic.
Distribution. SW Fiji, on Kadavu and Ono. Introduced to Viti Levu.



Descriptive notes. 45 cm. Very similar to *P. tabuensis* but head and underparts bright crimson, with broad blue collar across upper mantle. Female has smaller bill. Immature similar to adult.

Habitat. Mangrove, forest at all elevations, edges of villages.

Food and Feeding. No information.

Breeding. No information.

Movements. Sedentary.

Status and Conservation. Not globally threatened. CITES II. Currently considered near-threatened. A BirdLife "restricted-range" species. On Kadavu numerous in 1970 in

Gasele Forest, and elsewhere widespread; but apparently very scarce and declining on Viti Levu, where only found near villages.

Bibliography. Blackburn (1971), Clunie (1984), Collar *et al.* (1994), Holyoak (1979), Low (1994b), Mayr (1945b), Pratt *et al.* (1987), Rinke (1989a), Watling (1982a).

71. Masked Shining-parrot

Prosopeia personata

French: Perruche masquée **German:** Maskensittich **Spanish:** Papagayo Enmascarado
Other common names: Yellow-breasted Shining-parrot, Masked Musk-parrot

Taxonomy. *Coracopsis ? personata* G. R. Gray, 1848, New Guinea? Monotypic.

Distribution. SW Fiji, on Viti Levu; also early reports from adjacent Ovalau and Mbau.



Descriptive notes. 47 cm. Bright green, with black forehead and area on face round eye to chin, broad yellow rough-edged patch from upper breast to vent, where turns to red; outer webs of primaries deep blue; tail below brownish black. Female has smaller bill. Immature has paler bill.

Habitat. Mature forest, secondary growth, edges of villages, mangroves, subsistence gardens, from coasts up to 1200 m.

Food and Feeding. Seeds and fruits including wild figs; also cultivated fruits such as *Inocarpus fagiferus*, guavas and mangoes; flowers of banana palms; caterpillars; and rip-

ening grain.

Breeding. Jul-Sept. Nest in hole in tree. Eggs 2, although locals have reported 3-4 young in family parties.

Movements. Sedentary.

Status and Conservation. Not globally threatened. CITES II. Currently considered near-threatened. A BirdLife "restricted-range" species. Fairly common, and very frequent in the Nausori Highlands in 1970, but some concern remains over the impact of fragmentation of habitat with continuing forest clearance.

Bibliography. Blackburn (1971), Clunie (1984), Collar *et al.* (1994), Dahl (1986), Holyoak (1979), Low (1994b), Mayr (1945b), Pratt *et al.* (1987), Rinke (1989a), Watling (1982a), Wood & Wetmore (1926).

72. Red Shining-parrot

Prosopeia tabuensis

French: Perruche pompadour **German:** Pompadoursittich **Spanish:** Papagayo Granate
Other common names: Red-breasted Shining-parrot, Red Musk-parrot

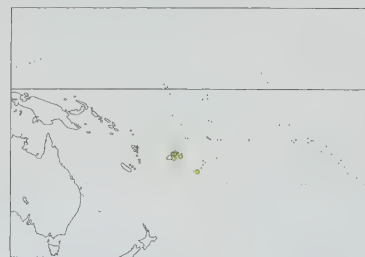
Taxonomy. *Psittacus tabuensis* J. F. Gmelin, 1788, Tonga Tabu, Tonga Islands.

Sometimes considered conspecific with *P. splendens*, but latter may be closer to *P. personata*. Nominate race often restricted to birds of Gau (Fiji) and Tonga, with those of Koro placed in *koroensis* and remainder in *atrogularis*, on basis of presence and extent of blue nuchal collar and maroon feather fringes on rump and uppertail-coverts, but these characters now known to be variable within populations; situation somewhat confused, especially due to probable mixtures resulting from introductions. Two subspecies currently recognized.

Subspecies and Distribution.

P. t. tabuensis (J. F. Gmelin, 1788) - Vanua Levu, Kioa, Koro and Gau in Fiji, and 'Eua in Tonga; formerly Tongatapu in Tonga, where the few birds now present are escapes.

P. t. taviunensis (E. L. Layard, 1876) - Taveuni and Ngamea (Qamea), Fiji.



Descriptive notes. 45 cm; mean 280 g. Forehead and lores black shading to deep maroon on mid-crown, nape and face, and to dull red on underparts; blue nuchal collar varies from broad to narrow to absent; outer wing-coverts, primaries and edges of tail deep blue; rest of uppersides and upper tail oil green, sometimes with varying amounts of dark maroon edging to feathers of rump and upper row of uppertail-coverts; tail below blackish brown. Female has smaller bill. Immature has paler bill. Race *taviunensis* invariably lacks blue hindneck and has shorter wings.

Habitat. Chiefly forest (with *Myristica hypargyrea* dominant, 'Eua) including mangroves and secondary scrub, but also commonly in village gardens and outskirts, and on Ngau throughout agricultural areas; altitudinal restriction mainly to above 380 m, Taveuni, presumably only owing to conversion of lower areas to coconuts, etc. On 'Eua, distribution exactly coincident with forest and forest patches, with only occasional records from plantations and low secondary growth.

Food and Feeding. Over 30 foodplants identified, 'Eua, where top ten food-plants in descending order are *Myristica hypargyrea*, *Psidium guajava*, *Inocarpus fagiferus*, *Calophyllum neo-eudicum*, *Rhus taitensis*, *Elattostachys falcata*, *Carica papaya*, *Malisia*, *Pleignium timoriense* and *Melodinus vitense*; elsewhere small wild bananas seen taken, also apparently insect larvae extracted from rotting wood. On 'Eua about 20% of feeding observations have involved introduced plants, but claims of crop damage have been exaggerated.

Breeding. May-Oct. Nest in hollow branch or hole in tree, once in the branch of large kau (*Burckellia richii*), once at 1750 m; on 'Eua the chief tree used is *Rhus taitensis* followed by *Elattostachys falcata* and *Laportea harveyi*. Eggs 2-3; incubation period 24 days; fledging c. 7 weeks.

Movements. Sedentary.

Status and Conservation. Not globally threatened. CITES II. A BirdLife "restricted-range" species. Common (but not flock-forming) in remaining forest, 'Eua (Tonga), with 500-1500 birds estimated, but habitat loss is rapid and a major decline towards extinction is predicted there; introduction to Tofua has been proposed. Habitat loss was the factor that caused its disappearance from Tongatapu, the type locality. Common on Taveuni, 1973. Apparently thriving, Ngau.

Bibliography. Blackburn (1971), Clunie (1984), Dahl (1986), Hay (1986), Holyoak (1979), Lever (1987), Low (1994b), Mayr (1945b), Pratt *et al.* (1987), Rinke (1986a, 1986b, 1987, 1988a, 1988b, 1989a, 1989b, 1993), Stevens (1996), Watling (1982a, 1985).

Genus *EUNYMPHICUS* J. L. Peters, 1937

73. Horned Parakeet

Eunymphicus cornutus

French: Perruche cornue **German:** Hornsittich **Spanish:** Perico Cornudo

Taxonomy. *Psittacus cornutus* J. F. Gmelin, 1788, New Caledonia.

On occasions has been lumped into genus *Cyanoramphus*. Races may merit treatment as two distinct species. Two subspecies recognized.

Subspecies and Distribution.

E. c. cornutus (J. F. Gmelin, 1788) - New Caledonia.

E. c. uvaensis (E. L. & E. L. C. Layard, 1882) - Ouvea (Loyalty Is).



Descriptive notes. 32 cm. Generally green, more yellowish on underparts, with rump, ear-coverts and nape greenish yellow; forehead to mid-crown red with several red-tipped black crest-feathers; front of face around eye to chin smudgily black; outer webs of primaries violet blue; tail distally shaded violet, lateral feathers violet tipped whitish. Immature greener, with crown mostly black. Race *uvaensis* lacks yellow tinging on head, with more crest feathers, all green, and red more restricted on crown.

Habitat. Forests, notably *Agathis-Araucaria* dominated, and general wooded areas, but avoiding coconut plantations and coastal areas.

Food and Feeding. Berries of vines, seeds of various trees and shrubs, notably "penubree tree", *Agathis lanceolata* and *Lantana camara*. On Ouvea, food includes flowers and fruits of "forest" trees such as *Syzygium*, *Ficus* and *Mimusops*, and adjacent trees and plants of cultivated areas such as *Carica papaya*, *Capsicum*, *Passiflora*, *Psidium*, *Solanum* and *Muesia novo-caledonica*; bark of *Hibiscus tiliaceus* also eaten.

Breeding. Sept-Mar. Nest in hole in dead or living tree, species including (on New Caledonia) *Metrosideros* and (Ouvea) *Syzygium*, *Mimusops*, *Dysoxylum*, *Intsia* and *Ficus*. Eggs 2-4, although usually only 2 young are reared; in captivity, incubation lasts 21-22 days, nestling period 5-6 weeks.

Movements. Sedentary; when birds from Ouvea were introduced to island of Lifou in an attempt to establish a new population, they reportedly flew back.

Status and Conservation. **VULNERABLE.** CITES II. A BirdLife "restricted-range" species. Nominate *cornutus* has declined substantially since the 1880's owing to habitat loss and the cagebird trade and may now number several thousand individuals. Following habitat conversion to plantations and the effects of overtrapping, race *uvaensis* was believed to number 100-200 birds in the early 1990's, but numbers were estimated at 617±379 birds in Dec 1993; possibly the most important factor here is the absence of predatory rats on the island, but 30-50 birds are captured annually for the pet trade, and this must be brought under control.

Bibliography. Bregulla (1993), Bruce (1978), Collar *et al.* (1994), Delacour (1966), Hahn (1993), Hannecart (1988), Hannecart & Létocart (1983), Hay (1986), King (1978/79), Low (1994b), Mayr (1945b), Quinque (1980),

Rinke (1997a), Robinet (1996), Robinet, Barre & Silas (1996), Robinet, Beugnet *et al.* (1995), Vincent (1967), Vriends (1979), Warner (1947).

Genus *CYANORAMPHUS* Bonaparte, 1854

74. Antipodes Parakeet

Cyanoramphus unicolor

French: Perruche des Antipodes **German:** Einfarbsittich **Spanish:** Perico de las Antipodas
Other common names: Antipodes Green Parakeet

Taxonomy. *Platyercus unicolor* Lear, 1831, Antipodes Island. Monotypic.

Distribution. Antipodes Is.



Descriptive notes. 30 cm. Green, bright emerald on forehead and face, olive on rest of plumage, yellow below; outer webs of primaries purplish blue, tail margined yellow. Immature undescribed.

Habitat. Tall dense *Poa litorosa* tussocks, especially on coastal slopes and along watercourses, whereas sympatric *C. novaezelandiae* tended to occupy more open terrain.

Food and Feeding. *Poa* and *Carex* leaves comprised 70% of records, with seeds (13%), berries, flowers and other vegetation (10%), and carrion of penguins and petrels (6%).

Breeding. Oct-Jan. Nest in well-drained bur-

row, 1 m or more long, excavated in fibrous peat beneath vegetation or in thick matted bases of tall tussocks. Clutch size unknown, but 1-3 fledged young recorded.

Movements. Sedentary.

Status and Conservation. VULNERABLE. CITES II. A BirdLife "restricted-range" species. Generally common, with a total population estimated at 2000-3000 birds. The only threat to this species is the accidental introduction of some predator (rats or cats) from a fishing or other passing vessel; although once a remote possibility, increased fishing pressure in waters around the (uninhabited) Antipodes has greatly heightened the chances of such an event.

Bibliography. Anon. (1996a), Chambers (1989), Collar & Andrew (1988), Collar *et al.* (1994), Falla *et al.* (1981), Fingland (1994), Goudswaard (1988), Greenway, J.C. (1967), Oliver (1974), Robertson (1985), Taylor (1975, 1985), Warham & Bell (1979), Williams & Given (1981).

75. Red-fronted Parakeet

Cyanoramphus novaezelandiae

French: Perruche de Sparman **German:** Ziegensittich **Spanish:** Perico Maorí Cabecirrojo
Other common names: Red-crowned Parakeet; Norfolk Parakeet (*cookii*); New Caledonian Parakeet (*saisseti*)

Taxonomy. *Psittacus Novae Zelandiae* Sparman, 1787, Dusky Sound, South Island.

Races *cookii* and *saisseti* sometimes considered separate species. Races *erythrotis* of Macquarie I and *subflavescens* of Lord Howe I extinct. Six extant subspecies recognized.

Subspecies and Distribution.

C. n. saisseti J. Verreaux & Des Murs, 1860 - New Caledonia.

C. n. cookii (G. R. Gray, 1859) - Norfolk I.

C. n. cyanurus Salvadori, 1891 - Kermadec Is.

C. n. novaezelandiae (Sparman, 1787) - New Zealand, on North I, South I, Stewart I, Auckland Is and many offshore islands.

C. n. chathamensis Oliver, 1930 - Chatham Is.

C. n. hochstetteri (Reischek, 1889) - Antipodes Is.



Descriptive notes. 27 cm; 50-113 g. Green, more yellowish below; frontal band through and behind eye, and forehead to mid-crown, red; patch each side of rump red; outer webs of primaries dark blue. Immature has less red on head, shorter tail. Race *cyanurus* bluer on flight-feathers with greenish blue tail; *chathamensis* like nominate but face bright emerald; *hochstetteri* larger and more yellowish, red markings more orange; *cookii* like nominate but larger; *saisseti* like nominate but more yellowish, and red lighter and brighter.

Habitat. Originally throughout native forests at all altitudes, now chiefly in remaining forest at low altitudes than *C. auriceps*, but in forest, scrubland and open areas on smaller islands. On the treeless Antipodes birds are terrestrial, occupying more open areas and low coastal vegetation than sympatric *C. unicolor*.

Food and Feeding. Much seasonal variation in diet, with buds and blossoms being consumed in spring, fruit in summer and seeds in autumn, with seeds and fruit together in winter. On Poor Knights Is birds took flowers of *Metrosideros excelsa* in Oct-Nov, seeds of *Leptocarpus*, *Cortaderia richardii*, *Coprosma macrocarpa* and *Macropiper exulans* in Jan, seeds of *Pittosporum crassifolium* in Feb-May and Aug. On Antipodes Is the main food was seeds of *Poa litorosa* grass and *Carex appressa* sedge (55% of records), with flowers (20%), berries (9%), leaves and buds (8%) and invertebrates (5%). On Norfolk I seeds and blossoms of *Baloghia lucida* and blossoms of *Lagunaria patersonia* preferred, supplemented by fruits of various exotic shrubs and trees, and leaf shoots and seeds of Norfolk Island pines (*Araucaria heterophylla*). In autumn on Rangitira (South-east) I, Chathams, seeds of *Plagianthus regius* and *Hebe dieffenbachii* and fruits of *Myoporum laetum* were most important (60% records). Seeds of casuarinas important in New Caledonia.

Breeding. Nov-Jan in New Caledonia, but any time of year elsewhere in N; Oct-Dec in S. Nest in hole in tree or cliff bank, in natural fissure in rock, in burrow in ground or matted vegetation; in Antipodes, birds make tunnels in the crowns of tall tussocks or clumps of ferns. Eggs 5-9; incubation lasts c. 20 days; nestling period 5-6 weeks. Males may have higher survival rate than females.

Movements. In early days of human settlement irruptive behaviour was noted at certain localities, and there still may be some seasonal wandering. Birds regularly commute between islands, whether mainland to offshore or offshore to offshore; dispersers from Macaulay in the Kermadecs occasionally cover the 40 km to Curtis I.

Status and Conservation. Not globally threatened. Race *cookii* has been treated as a full species and accorded Critically Endangered status. CITES I. Greatly reduced from historical levels on two main islands, but still common on Stewart and many offshore islands. Antipodes (an estimated 4000-5000 individuals in 1978) and Auckland Is. On Chathams numbers greatly reduced by habitat loss and predation on two main islands, but abundant on the small Rangitira, and numbers controlled on Mangere and Little Mangere as part of conservation efforts for *C. forbesi*. On Kermadec Is introduced predators wiped out Raoul I population 150 years ago, but over 10,000 birds survived in 1980 on Macaulay following goat eradication in 1960's, with small numbers on other islands. The species is uncommon on New Caledonia. Norfolk I population (race *cookii*) numbered 40 birds (with 13 in captivity) in 1991, having suffered from hunting, habitat destruction, predation by rats and nest-site competition from introduced *Platyercus elegans*, European Starlings (*Sturnus vulgaris*) and honeybees, but now starting to recoup following years of active management. Translocation of birds from Norfolk to Lord Howe I has been urged, given that fewer threats exist there and extinction was reputedly caused by human persecution; translocation at least to Philip I likely. Extinction on Macquarie attributed to predation by feral cats following the reduction of habitat by rabbits.

Bibliography. Bellingham (1987), Bregulla (1993), Butler (1986), Chambers (1989), Christidis & Boles (1994), Collar *et al.* (1994), Dawe (1979), Falla *et al.* (1981), Fingland (1994), Forshaw (1981a, 1981b, 1981c), Freeman (1994), Garnett (1993), Greene (1989a), Greenway, J.C. (1967), Greenwood (1991), Hannecart & Létocart (1980), Hay (1986), Hermes (1985), Hicks & Greenwood (1990), King (1978/79), Kinsky (1970), Low (1994b), MacMillan (1990), Merton (1970), Nilsson *et al.* (1994), Nixon (1982, 1994), O'Donnell & Dilks (1993), Porter (1939), Remington (1987), Robertson (1985), Sagar (1988), Schmidt (1997), Schodde *et al.* (1983), Soper (1976), Taylor (1975, 1979, 1985), Triggs & Daugherty (1996), Veitch (1979), Vriends (1979), Warham & Bell (1979), Williams (1975).

76. Yellow-fronted Parakeet

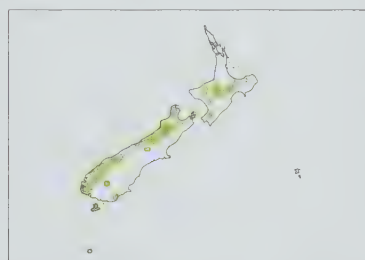
Cyanoramphus auriceps

French: Perruche à tête d'or **German:** Springsittich **Spanish:** Perico Maorí Cabecigualdo
Other common names: Yellow-crowned Parakeet, Yellow-fronted Kakariki

Taxonomy. *Psittacus auriceps* Kuhl, 1820, New Holland = South Island, New Zealand.

Normally considered to include *C. forbesi* and *C. malherbi* as a race and a variant respectively, but these forms perhaps better treated as separate species. Monotypic.

Distribution. New Zealand area, on North I, South I, Stewart I and Auckland Is, and several small offshore islands.



Descriptive notes. 23 cm. Very similar to *C. novaezelandiae* but head simply with red frontal band extending to eyes, backed by yellow crown.

Habitat. Prefers mixed *Nothofagus*-*Podocarpus* forest, usually at higher altitudes than *C. novaezelandiae*, and, where the two occur together on small islands, prefers taller unbroken forest and scrub, with *C. novaezelandiae* occupying more open areas and lower vegetation.

Food and Feeding. Seeds including grass seeds, many kinds of berry, shoots, buds, flowers and invertebrates, on main islands taken in

trees, but on predator-free islands often from the ground; seeds of *Pseudopanax*, *Leptospermum*, thistles and flowers of *Senecio*, *Hymenanthera*, *Phormium* and *Coprosma*; seeds of *Ixerbia* and fruit of *Dysoxylum* also noted. Invertebrates important in diet, including scale insects *Ultracoelostoma assimile* and caterpillars of *Heliothis vibratrix*.

Breeding. Main period Oct-Dec, but nesting recorded in all months except May and Jun. Nest in hollow limbs or holes in trunks, often dead or decaying stumps. Eggs 5-9.

Movements. Sedentary.

Status and Conservation. Not globally threatened. CITES II. Currently considered near-threatened. Formerly widespread and common, now confined to larger tracts of remaining native forest, with numbers varying from rare to locally fairly common, but essentially now stable following steady increases since 1950. However, felling of native lowland forest for exotic pine plantations continues to pose a threat. Common on Stewart, the Auckland and other islands, where introduced predators, in particular rats, are absent.

Bibliography. Butler (1986), Chambers (1989), Falla *et al.* (1981), Fingland (1994), Greene (1989a), Greenway, J.C. (1967), Kinsky (1970), Low (1994b), Ogle (1981), Oliver (1974), Palser (1991), Robertson (1985), Soper (1976), St. Paul (1977), Taylor (1975, 1985), Triggs & Daugherty (1996), Veitch (1979), Vriends (1979).

77. Chatham Parakeet

Cyanoramphus forbesi

French: Perruche des Chatham **German:** Chathamsittich **Spanish:** Perico de las Chatham
Other common names: Chatham Yellow-fronted/Forbe's Parakeet

Taxonomy. *Cyanoramphus* [sic] *forbesi* Rothschild, 1893, Chatham Islands.

Since 1930 commonly treated as a race of *C. auriceps*, but genetic differences considerable; clearly, however, the two are very closely related. Monotypic.

Distribution. Chatham Is, on Mangere I and Little Mangere I, and formerly also Pitt I.

Descriptive notes. 26 cm. Extremely similar to *C. auriceps*, but larger and brighter, with more yellowish underparts, red frontal band not extending to eyes, sides of face emerald green and outer webs of flight-feathers greenish blue.

Habitat. Dense unbroken forest or scrub.

Food and Feeding. In spring, Oct-Nov, main foods are invertebrates, flowers and seeds, while in autumn, Mar-May, more leaves and seeds are eaten.

Breeding. Oct-Mar. Nest in hollow limbs or holes in trunks, often dead or decaying stumps.



Movements. Sedentary, with pairs generally occupying territories year-round.

Status and Conservation. ENDANGERED. CITES I (where treated as *C. auriceps forbesi*). Highly threatened, although the population is slowly increasing through a habitat management and competitor control programme. In 1938 there were over 100 birds, in 1968 20-30, and a decade later the species was confined to 4 ha of bush at the summit of Little Mangere I; however, reforestation of Mangere has allowed a slow recolonization. Native *C. novaezelandiae* benefited from forest clearance and began hybridizing with

present species, but with intervention there were 40 pure individuals of present species on Mangere in 1982, when about 16 were judged to survive in still-deteriorating habitat on Little Mangere. In 1970's and 1980's evidence for either a remnant population on or a recolonization of the main Chatham I emerged, but may have only involved one or two birds.

Bibliography. Ellis (1975), Erritzoe (1993), Flack (1976), Fleming (1939), Freeman (1994), Greene (1989b), Johnstone (1985), King (1978/79), Kinsky (1970), Low (1994b), Melville (1984), Nixon (1982, 1994), Taylor (1975, 1985), Triggs & Daugherty (1996).

78. Malherbe's Parakeet

Cyanoramphus malherbi

French: Perruche de Malherbe **German:** Malherbesittich **Spanish:** Perico Maorí Montano
Other common names: Orange-fronted Parakeet(!)

Taxonomy. *Cyanoramphus Malherbi* Souancé, 1857, South Island, New Zealand.

Since 1974 the view that this is a colour morph of *C. auriceps* has gained wide acceptance, but very recent evidence suggests assortative mating among the few surviving wild birds, so specific status should perhaps be retained. Monotypic.

Distribution. Formerly scattered through most of New Zealand; now confined to N South I.



Descriptive notes. 20 cm. Very similar to *C. auriceps* but frontal band orange, crown pale yellow, patches either side of rump orange. Immature almost lacks frontal band.

Habitat. Fringes of *Nothofagus* forest, in one area being found breeding only at 600-900 m in forest of *N. fusca*, but with preference for areas bordering stands of *N. solandri*; in past reported from sea-level to subalpine scrublands.

Food and Feeding. Scale insects, flower and leaf buds, flowers, young leaves, berries and seeds.

Breeding. Oct. Nest in hole in living or dead tree. Eggs 3.

Movements. No information.

Status and Conservation. CRITICALLY ENDANGERED. CITES II (where included in *C. auriceps*). Species at great risk of extinction, given that its population could well be under 250 individuals and declining. Captive breeding involving mixed pairs of present species and *C. auriceps* needs to be reconsidered.

Bibliography. Chambers (1989), Ellis (1975), Falla *et al.* (1981), Fleming (1980), Greene (1989a), Greenway, J.C. (1967), Harrison (1970), Heatherbell (1992), Holyoak (1974a), King (1978/79), Kinsky (1970), Low (1994b), Nixon (1981), Oliver (1974), Read & McClelland (1984), Robertson (1985), Sibson (1982), Taylor (1975, 1985), Taylor *et al.* (1986), Triggs & Daugherty (1996).

Genus *PURPUREICEPHALUS*

Bonaparte, 1854

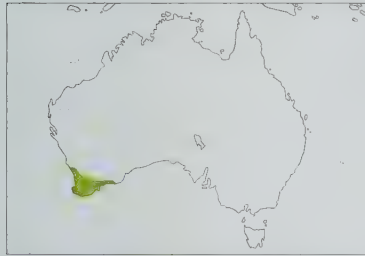
79. Red-capped Parrot

Purpureicephalus spurius

French: Perruche à tête pourpre **German:** Kappensittich **Spanish:** Perico Capelo
Other common names: Pileated Parakeet

Taxonomy. *Psittacus spurius* Kuhl, 1820, Albany, south-western Australia. Sometimes placed in genus *Platycercus*. Monotypic.

Distribution. Extreme SW Australia, mostly within 100 km of coast.



Descriptive notes. 36 cm; 98-156 g. Entire crown crimson, face and ear-coverts yellowish green; underparts purple, with flanks, thighs and undertail-coverts red; nape, mantle and wing-coverts green, flight-feathers dark, with underwing-coverts and outer webs of primaries dull blue; rump and uppertail-coverts yellowish green; tail green, distally darker, lateral feathers pale blue tipped whitish. Female duller, with wing stripe on underwing; flanks and undertail-coverts with green. Immature has green head, dull russet breast and belly.

Habitat. Marri *Eucalyptus calophylla* forest

and trees in pristine and altered landscapes including farmland, roadsides and watercourses, also visiting parkland and orchards.

Food and Feeding. Seeds of marri and other eucalypts, notably jarra *E. marginata* and *E. cornuta*, also those of *Grevillea*, *Hakea*, *Casuarina*, *Xylomelum*, *Agonis* and grasses, especially *Avena fatua*; plus blossoms (several eucalypts), leaf buds and insects and their larvae, in particular psyllid lerps. Sometimes damages apples, pears and citrus fruits.

Breeding. Aug-Dec. Nest in hollow limb or hole in tree, commonly high in jarra, marri or wandoo (*E. wandoo*). Eggs 4-7; incubation lasts c. 20 days; nestling period c. 5 weeks.

Movements. Adults are mainly sedentary but fluctuations in local numbers of immatures occur according to food availability; also nomadism at dry edges of range.

Status and Conservation. Not globally threatened, CITES II. Fairly common, sometimes entering suburbs of Perth. While marri, regarded as a weed species, may actually have spread following human occupation of SW Australia, thus benefiting this parrot, poor regeneration of nest-trees is a long-term cause for concern, and the restricted range of the species compounds the situation. In two shires of Western Australia there are open seasons when birds may be killed to reduce orchard damage.

Bibliography. Blakers *et al.* (1984), Cain (1955), Cook (1980), Forshaw (1981b), Jenkins (1969), Lindsey, T.R. (1992), Long (1984, 1985), Macdonald (1988), Mawson & Long (1994), Pizzey & Doyle (1980), Saunders & Ingram (1995), Schodde & Tidemann (1986), Simpson & Day (1996), Stoneman *et al.* (1997), Tronson & Tronson (1987), Vriends (1979).

Genus *BARNARDIUS* Bonaparte, 1854

80. Port Lincoln Ringneck

Barnardius zonarius

French: Perruche à collier jaune **German:** Ringsittich **Spanish:** Perico de Port Lincoln
Other common names: Ringneck Parrot, Australian/Western Ringneck; Twenty-eight Parrot (*semitorquatus*)

Taxonomy. *Psittacus zonarius* Shaw, 1805, Port Lincoln, South Australia.

Genus sometimes combined into *Platycercus*. Forms a parapatric species pair with *B. barnardi*, with which often considered conspecific. Three subspecies recognized.

Subspecies and Distribution.

B. z. semitorquatus (Quoy & Gaimard, 1830) - extreme W Western Australia.

B. z. occidentalis (North, 1893) - SW Western Australia.

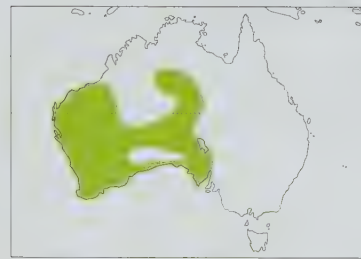
B. z. zonarius (Shaw, 1805) - Western Australia E to SC Northern Territory and SC South Australia.

Feral (presumably race *zonarius*) around Melbourne, Victoria.

Descriptive notes. 38 cm; 121-200 g. Head dull blue-black sometimes with red frontal band; yellow collar broken at throat; breast, mantle, back and wings green hazed pale blue, with fuller pale blue edging on median and outer secondary coverts, primaries blackish; belly yellow shading to yellowish green on vent and undertail-coverts; rump and tail blue-green, latter darker distally and with outer feathers pale blue shading to white at tips. Female similar but generally greener with head browner. Immature duller. Race *semitorquatus* larger, with strong red frontal band, green belly; *occidentalis* smaller, with pale blue lower ear-coverts and yellow of belly extending to undertail-coverts.

Habitat. Wide variety used, including dense coastal forests, wheatbelt farmlands, mallee and semi-arid *Eucalyptus* woodlands, arid *Acacia* or *Casuarina* interior scrublands and even sparsely vegetated country as long as tree-lined watercourses penetrate them to provide nest-sites.

Food and Feeding. In forest areas, fruits and sometimes nectar of *Eucalyptus*, especially marri (*E. calophylla*), and other species, including exotic ornamentals such as *Melia azedarach*; in



more arid country, seeds of grasses and herbaceous plants, with birds seen digging up corms of onion grass (*Romulea longifolia*), eating small leaves of capeweed (*Cryptotemma calandula*) and taking grain spilt by lorries along roads. Stomachs held seeds of *Lysiana exocarpi*, *Solanum* and mistletoe, *Eremophila* buds, and wood-boring larvae. Birds pull back eucalypt bark to obtain lerps, and eat sawfly *Perga* larvae from eucalypt seedlings and *Macrobathra* moth larvae from galls on *Cassia*; and can damage cereal crops and cultivated fruit.

Breeding. Aug-Feb in C and S of range, sometimes with two broods; Jun-Sept in N of range. Nest in hole in tree, commonly in salmon gum (*Eucalyptus salmonophloia*) and wandoo (*E. wandoo*). Eggs 4-7, usually 5; incubation lasts 19 days; nestling period c. 5 weeks.

Movements. Normally sedentary in more wooded parts of range, but in arid country nomadic movements recorded, e.g. many thousands appeared on NW edge of Nullarbor Plain, Jan 1975, and are probably common in response to water availability.

Status and Conservation. Not globally threatened, CITES II. A fairly common species throughout one-third of Australian continent, and abundant in Western Australian wheatbelt (considered perhaps the commonest bird species) where in two shires an open season has existed to control crop depredations; the creation of reservoirs for livestock has benefited populations in pasturelands. However, poor regeneration of nest-trees, which are many hundreds of years old, is a long-term cause for concern.

Bibliography. Baumgarten (1990), Blakers *et al.* (1984), Brooker (1973), Brooker *et al.* (1979), Cain (1955), Christidis & Boles (1994), Emison *et al.* (1987), Fisher (1970), Forshaw (1981b), Hall (1974), Jenkins (1969), Laubscher (1997b), Lindsey, T.R. (1992), Long (1984, 1985), Macdonald (1988), Mawson & Long (1994), Nichols (1978), Pizzey & Doyle (1980), Richardson & Wooller (1990), Robinson (1960), Saunders & Ingram (1995), Schodde & Tidemann (1986), Simpson & Day (1996), Stoneman *et al.* (1997), Storr (1977), Tronson & Tronson (1987), Vriends (1979).

81. Mallee Ringneck

Barnardius barnardi

French: Perruche de Barnard **German:** Barnardsittich **Spanish:** Perico de Barnard
Other common names: Barnard's Parakeet, Eastern Ringneck; Cloncurry Parrot (*macgillivrayi*)

Taxonomy. *Platycercus Barnardi* Vigors and Horsfield, 1827, New South Wales.

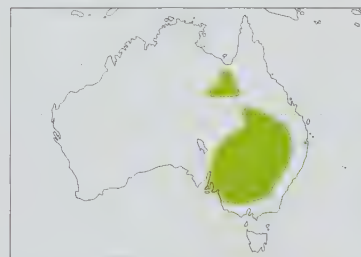
Genus sometimes combined into *Platycercus*. Forms a parapatric species pair with *B. zonarius*, with which often considered conspecific. Race *macgillivrayi* may be closer to *B. zonarius*, and may be separate species; race *whitei* apparently hybridizes sometimes with *B. zonarius*. Three subspecies recognized.

Subspecies and Distribution.

B. b. macgillivrayi (North, 1900) - E Northern Territory and NW Queensland.

B. b. whitei (Mathews, 1912) - Flinders Ranges, South Australia.

B. b. barnardi (Vigors & Horsfield, 1827) - SE Australia.



Descriptive notes. 33 cm; 105-143 g. Head and undersides mainly green, but with red frontal band, dark green hindcrown joined to postocular stripe, and pale blue tinge at base of bill; yellow half-collar across nape; mantle and back blackish blue; scapulars and secondaries dark green; lesser wing-coverts dark blue; primary and outermost secondary coverts pale blue; median and other secondary coverts green; primaries blackish; rump mid-green; tail dark green with blue outer feathers that shade to white at tips. Female duller, with paler mantle and evidence of wing stripe. Immature like female with brownish

green head. Race *whitei* has dark grey-green mantle, brownish crown; *macgillivrayi* lacks red forehead and replaces dark green of crown, mantle and tail with paler green, as well as having more blue on face, and belly yellow.

Habitat. Mallee (low *Eucalyptus* scrubland), open woodland and trees along watercourses. *Callitris* woodland and *Acacia* scrub; race *macgillivrayi* prefers woodland savanna and riverside forest, especially in hilly country.

Food and Feeding. Seeds of paddy melons (*Cucumis myriocarpus*), bitter melons (*Citrullus lanatus*), fruits of the introduced tobacco tree (*Nicotiana glauca*), and blossoms and seeds of various *Eucalyptus* species, including *E. camaldulensis*, *E. gracilis* and *E. cladocalyx*, are known to be favoured. Commonly feeds on ground, and grass seeds, plus those of Portulacaceae and *Solanum*, have been found in stomachs.

Breeding. Aug-Jan, if not delayed or even prevented by drought, but occasionally with two broods reared; Feb-Jun for *macgillivrayi*. Nest in hollow limb or hole in tree; *macgillivrayi* selects *Eucalyptus camaldulensis*. Eggs 4-6; incubation lasts c. 20 days; nestling period c. 5 weeks.

Movements. Generally sedentary, although local movements may occur in response to climatic conditions.

Status and Conservation. Not globally threatened, CITES II. Still common in many areas, but apparently intolerant of human settlement of range, declining in face of mallee and woodland clearance for grazing and cultivation. Race *macgillivrayi*, often judged uncommon, is fairly plentiful and widespread.

Bibliography. Blakers *et al.* (1984), Cain (1955), Christidis & Boles (1994), Emison *et al.* (1987), Fisher (1970), Ford (1988), Ford & Parker (1974), Forshaw (1981b), Hall (1974), Horton (1975), Lindsey, T.R. (1992), Macdonald (1988), Pizzey & Doyle (1980), Schodde & Tidemann (1986), Simpson (1973), Simpson & Day (1996), Storr (1973), Tronson & Tronson (1987), Vriends (1979).

Genus *PLATYCERCUS* Vigors, 1825

82. Green Rosella

Platycercus caledonicus

French: Perruche à ventre jaune **German:** Gelbbauchsittich **Spanish:** Perico de Tasmania
Other common names: Tasmanian Rosella

Taxonomy. *Psittacus caledonicus* J. F. Gmelin, 1788, New Caledonia; error = Adventure Bay, Tasmania.

Monotypic.

Distribution. Tasmania and larger Bass Strait islands.



Descriptive notes. 36 cm; 90-165 g. Bill whitish, broad frontal band red, lower cheek and chin grey-blue; rest of head yellow, mottled black on nape; upperparts and tail dull green, with lighter edges on mantle and scapulars creating vague scaled effect, and with pale grey-blue on wing coverts, outer edges of primaries, and outer tail feathers; underparts yellow sometimes washed orange, and with orange flecks around vent. Female smaller, usually with orange around throat. Immature mostly dull green.

Habitat. All wooded habitats within range are used, birds penetrating urban areas and visiting orchards and gardens, but chief habitat is sclerophyll forest and savanna woodland; on Hunter I. apparently prefers rock-strewn gullies.

Food and Feeding. Seeds of eucalypts, myrtle, sassafras, *Acacia dealbata*, *Senecio linearifolius*, *Rumex*, *Solanum*, *Pimelea* and other trees, shrubs and grasses; berries of *Coprosma* and *Cyathodes* shrubs at higher altitudes, and of hawthorn *Crataegus* in winter; leaf-buds of *Salix viminalis*. *Schedorhiza* psyllids and insect larvae also taken.

Breeding. Sept-Feb. Nest in hollow limb or hole in tree, usually a eucalypt, but also in walls of remote decayed buildings and in one (failed) case when no suitable hollows available the disused nest of a passerine. Eggs 4-6; incubation lasts 19 days; nestling period c. 5 weeks.

Movements. Sedentary; birds in higher areas presumably descend to lower-lying areas in winter, although presence in winter near summits has been recorded. There is evidence of former wandering by flocks of immatures.

Status and Conservation. Not globally threatened. CITES II. A BirdLife "restricted-range" species. Common throughout small range, and only on King I. where much *Eucalyptus* has been cleared, has there been a significant reduction in numbers.

Bibliography. Blakers *et al.* (1984), Brothers (1979), Brown, P.B. (1977, 1984), Cain (1955), Forshaw (1981b), Green (1969, 1977a, 1977b), Green & McGarvie (1971), Green & Swift (1965), Lea & Gray (1935), Lindsey, T.R. (1992), Macdonald (1988), McColl (1957), Mollison (1974), Oviden *et al.* (1987), Pizzey & Doyle (1980), Ridpath & Moreau (1966), Schodde & Tidemann (1986), Sharland (1956), Simpson & Day (1996), Tronson & Tronson (1987), Vriends (1979).

83. Crimson Rosella

Platycercus elegans

French: Perruche de Pennant **German:** Pennantsittich **Spanish:** Perico Elegante
Other common names: Pennant's Parakeet, Pennant's/Blue-Cheeked Rosella

Taxonomy. *Psittacus elegans* J. F. Gmelin, 1788, New South Wales.

Forms a superspecies with *P. flaveolus*, with which often regarded as conspecific, due to extensive hybridization zone; *P. adelaidae* too commonly considered conspecific, and may also belong in the superspecies. Three subspecies recognized.

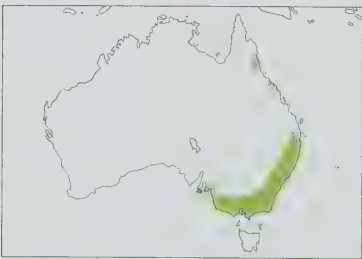
Subspecies and Distribution.

P. e. nigrescens E. P. Ramsay, 1888 - NE Queensland.

P. e. elegans (J. F. Gmelin, 1788) - SE Queensland to SE South Australia.

P. e. melanoptera North, 1906 - Kangaroo I (South Australia).

Introduced (probably *elegans*) to Norfolk I and New Zealand.



Descriptive notes. 36 cm; 112-169 g. Plumage predominantly red; bill whitish; dark red frontal band through eye, with broad grey-blue lower cheek; feathers of mantle, back and scapulars black edged red, giving scaled effect; lesser wing-coverts black, median and outer secondary coverts and outer secondaries pale grey-blue, flight-feathers blackish; tail above deep blue, lateral feathers tipped white, below pale grey-blue. Female similar to male. Immature largely green, retaining red and blue on crown and face, with red on vent. Race *nigrescens* darker and smaller; *melanoptera* has more black on

back.

Habitat. Coastal and adjacent mountain forests and clearings from sea-level to alpine woodlands at 1900 m, also penetrating outer suburbs of cities; most numerous in wet forests and wet woodlands.

Food and Feeding. Seeds of native pines *Callitris endlicheri*, blue fig (*Elaeocarpus grandis*), eucalypts and acacias, plus those of smaller introduced and native plants such as *Rosa rubiginosa*, *Rumex acetosella*, *Helichrysum scorpioides*, *Crataegus*, *Cotoneaster*, *Pyracantha*, *Danthonia*, *Stellaria media*, *Trifolium dubium*, *Onopordon acanthium*. At one site in S of range the seeds, fruits or blossoms of *Leptospermum*, *Melaleuca*, *Banksia*, *Casuarina*, *Pomaderris*, *Leucopogon*, *Kunzea*, *Spyridium* and most small shrubs, grasses and seaboard succulents were used. Stomachs have been found to hold Hemiptera and psyllid, termite, aphid and beetle larvae. Birds are sometimes a pest in apple, pear, plum and quince orchards.

Breeding. Aug-Feb or later. Nest in hollow limb or trunk of tree, usually a live or dead eucalypt; one record of repeat nesting in girder of operating crane. Eggs 4-7, rarely 8; incubation lasts 19 days; nestling period c. 5 weeks.

Movements. Nomadic movements reported in winter at edges of range, but otherwise sedentary.

Status and Conservation. Not globally threatened. CITES II. Generally common to abundant, but has lost ground to land clearance, when it is replaced by *P. eximius*.

Bibliography. Blakers *et al.* (1984), Cain (1955), Carter (1996), Chambers (1989), Christidis & Boles (1994), Cooper, R.P. (1975), Emison *et al.* (1987), Ford (1977), Forshaw (1981b), Hamel (1970), Hermes (1985), Lenz (1988), Lever (1987), Lindsey, T.R. (1992), Macdonald (1988), Oviden *et al.* (1987), Pizzey & Doyle (1980), Robertson (1985), Rose (1997b), Schodde & Tidemann (1986), Schodde *et al.* (1983), Simpson & Day (1996), Storr (1973), Tronson & Tronson (1987), Turner *et al.* (1968), Vriends (1979), Wyndham & Cannon (1985).

84. Yellow Rosella

Platycercus flaveolus

French: Perruche flavéole

German: Strohsittich

Spanish: Perico Gualda

Taxonomy. *Platycercus flaveolus* Gould, 1837, New South Wales.

Forms a superspecies with *P. elegans*, with which often regarded as conspecific, due to extensive hybridization zone; *P. adelaidae* too commonly considered conspecific, and may also belong in the superspecies. Monotypic.

Distribution. Interior SE Australia centred on the Murray-Murrumbidgee river systems.



Descriptive notes. 33-34 cm; 105-135 g. Similar to *P. elegans* but with pale yellow replacing all red, except for orange-red frontal band and lores, and with some orange-red markings on breast. Female usually has more orange-red breast markings, and often a pale underwing stripe. Immature has reduced frontal band, upperparts dull olive-green, underparts tinged greenish yellow; has underwing stripe.

Habitat. Stands of riverine red gums (*Eucalyptus camaldulensis*), especially where they form savanna woodland on floodplains, ranging out into adjacent mallee and farmland to

feed. Where sympatric, *P. elegans* uses box-ironbark and peppermint forests, not penetrating red gums.

Food and Feeding. Seeds and blossoms of *E. camaldulensis* and unspecified shrubs and grasses, and in autumn seeds of *Polygonum hydropiper* and *Onopordon acanthium*; seeds of paddy melon (*Cucumis myriocarpus*) and larvae of the cup moth (*Limacodes longerans*) also recorded.

Breeding. Aug-Jan. Nest high in large eucalypt. Eggs 4-5; incubation lasts 19 days; nestling period c. 5 weeks.

Movements. Formerly nomadic at edges of range, but now absent from these areas.

Status and Conservation. Not globally threatened. CITES II. Fairly common within restricted range, but has suffered some losses owing to large-scale irrigation schemes.

Bibliography. Blakers *et al.* (1984), Christidis & Boles (1994), Cole (1919), Emison *et al.* (1987), Ford (1977), Forshaw (1981b), Lindsey, T.R. (1992), Macdonald (1988), Oviden *et al.* (1987), Pizzey & Doyle (1980), Schodde & Tidemann (1986), Schrader (1979), Simpson (1973), Simpson & Day (1996), Tronson & Tronson (1987), Vriends (1979).

85. Adelaide Rosella

Platycercus adelaidae

French: Perruche d'Adélaïde

German: Adelaidesittich

Spanish: Perico de Adelaida

Taxonomy. *Platycercus Adelaidae* Gould, 1841, South Australia.

Often treated as conspecific with *P. elegans* and *P. flaveolus*, and has commonly been considered to represent a hybrid form of these two; alternatively, these three may form a superspecies; further investigation required. Two subspecies recognized.

Subspecies and Distribution.

P. a. subadelaidae Mathews, 1912 - S South Australia in S Flinders Ranges.

P. a. adelaidae Gould, 1841 - S South Australia from Mt Lofty Ranges to Fleurieu Peninsula.



Descriptive notes. 36 cm; 100-165 g. Very similar to *P. elegans* but individually variable: generally orange-red with narrow yellow edges to feathers of underparts and rump, amount of yellow increasing on flanks and sides of neck, with edges of mantle and back feathers yellow, those on wing-coverts orange-yellow. Female similar. Immature duller with breast and belly greyish green, upperparts olive-green, with underwing stripe. Race *subadelaidae* has orange-yellow underparts but head, flanks and rump far yellower.

Habitat. All types of wooded country, frequently penetrating suburban gardens and parks and regularly visiting farmyards to pick up spilt grain. Race *subadelaidae*, like *P. flaveola*, is largely confined to riverine red gum (*Eucalyptus camaldulensis*).

Food and Feeding. Diet consists of seeds of *Eucalyptus*, especially *E. camaldulensis*; also takes *Solanum nigrum*, *Xanthorrhoea spatha*, *Trifolium glomeratum*, *Acacia*, *Carduus tenuiflorus*; grains of cultivated cereals. Insect remains also found in stomachs, and berries witnessed being taken.

Breeding. Sept-Dec. Nest in hollow in live or dead eucalypt. Eggs 4-5, rarely 7; incubation lasts 19 days; nestling period c. 30 days.

Movements. Sedentary, but with local irregular movements at edges of range.

Status and Conservation. Not globally threatened. CITES II. Nominant race abundant within very small range, but *subadelaidae* local and uncommon.

Bibliography. Blakers *et al.* (1984), Boehm (1959), Cain (1955), Christidis & Boles (1994), Fisher (1993), Forshaw (1981b), Lea & Gray (1935), Lindsey, T.R. (1992), Macdonald (1988), Oviden *et al.* (1987), Pizzey

& Doyle (1980), Schodde & Tidemann (1986), Simpson & Day (1996), Tronson & Tronson (1987), Vriends (1979).

86. Northern Rosella

Platycercus venustus

French: Perruche gracieuse

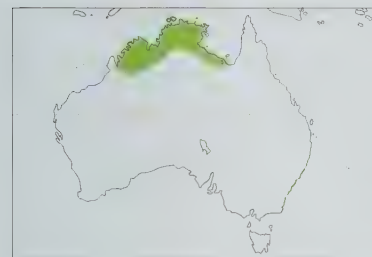
German: Brownsittich

Spanish: Perico Gracioso

Taxonomy. *Psittacus venustus* Kuhl, 1820, Arnhem Bay, Northern Territory.

Forms a superspecies with *P. adscitus* and *P. eximius*, and sometimes considered conspecific with both. Monotypic.

Distribution. N Australia and offshore islands from Barkly Tableland to King Sound.



Descriptive notes. 28 cm; mean 85 g. Bill whitish; head black except for off-white lower cheek and chin; underparts, lower back and rump pale yellow lightly edged black, giving weak scaled effect; vent red; nape, mantle and scapulars black with broad pale yellow edges, giving strong scaled effect; lesser wing-coverts black, median coverts blue-grey, remaining wing-coverts black edged yellow (inner) and blue-grey (outer), primaries black; tail bronze green centrally, outer feathers dark blue shading paler to white tips. Female similar. Immature duller and dusker, with scattered red in head, less red on vent.

Habitat. *Eucalyptus* and *Melaleuca* woodland in hilly country where access to water greater, plateau woodlands including those dominated by *Callitris intratropica*, occasionally visiting mangroves, parks and gardens.

Food and Feeding. Seeds of eucalypts, *Melaleuca* and *Acacia*, also *C. intratropica*; grass seeds and nectar also recorded. Birds in coastal woods sometimes feed on shoreline and creek banks.

Breeding. Jun-Sept, sometimes earlier. Nest in hollow limb or hole in tree, usually a eucalypt near water. Eggs 2-4; incubation lasts c. 19 days; nestling period c. 7 weeks.

Movements. Probably mainly sedentary, although in dry season birds retreat to vicinity of water-courses.

Status and Conservation. Not globally threatened. CITES II. Considered to be relatively uncommon overall, and only locally common. Evidence of former abundance disputed, so not clear if any decline has actually occurred since mid-19th century, and in any case no clear cause discernible; possibly this species has always been limited by habitat, especially the availability of dry-season refuges.

Bibliography. Blakers *et al.* (1984), Cain (1955), Christidis & Boles (1994), Forshaw (1981b), Johnstone *et al.* (1977), Lindsey, T.R. (1992), Macdonald (1988), Ovenden *et al.* (1987), Pizzey & Doyle (1980), Schodde & Tidemann (1986), Simpson & Day (1996), Smith *et al.* (1978), Storr (1977, 1980), Storr *et al.* (1975), Tronson & Tronson (1987), Vriends (1979).

87. Pale-headed Rosella

Platycercus adscitus

French: Perruche à tête pâle

German: Blaßkopfsroella

Spanish: Perico Pálido

Other common names: Mealy Rosella

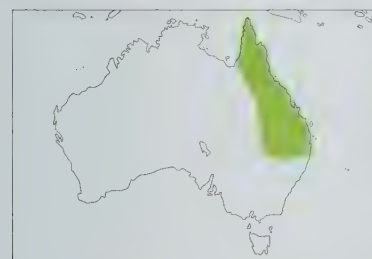
Taxonomy. *Psittacus adscitus* Latham, 1790, Cooktown, Queensland.

Forms a superspecies with *P. venustus* and *P. eximius*, and sometimes considered conspecific with both. Two subspecies recognized.

Subspecies and Distribution.

P. a. adscitus (Latham, 1790) - N Queensland.

P. a. palliceps Lear, 1832 - Queensland and N New South Wales.



Descriptive notes. 30 cm; 100-175 g. Bill and face white shading to yellow, lightly edged black, on nape and sides of neck; chin and lower cheeks grey-blue; mantle, back and scapulars black with broad yellow edges, making scaled effect, rump yellow; wing as in *P. venustus*; breast pale yellow shading to pale blue on belly; vent and undertail-coverts red; tail bluish green centrally, outer feathers blue tipped white. Female similar to male, but has pale underwing stripe. Immature like female but duller. Race *palliceps* lacks blue-grey on cheeks but usually has entire underparts grey-blue; rump pale blue to greenish blue.

Habitat. Occurs in variety of habitats, including savanna woodland, paperbark woodland, riverine and swamp growth, *Banksia*-dominated coastal heath, wet sclerophyll forest, fringes of lowland rain forest, farmland and clearings.

Food and Feeding. Wide range of plants utilized, with 47 species recorded; forages more arboreally than *P. eximius*. Seeds of *Eucalyptus camaldulensis*, *Casuarina cunninghamiana*, *Melaleuca linariifolia*, *Onopordon acanthium*, *Xanthium chinense*, *X. spinosum*, *Callitris* and *Acacia* recorded, also blossoms of *Melaleuca*, fruits of *Dodonaea triquetra*. Can be a pest in orchards and maize fields.

Breeding. Feb-Jun in N, though with some variation depending on rainfall, Sept-Dec in S. Nest in deep hollow in living or dead tree, preferably a eucalypt near a watercourse, but also in stump or hollow fence post. Eggs 3-5; incubation lasts 19 days; nestling period c. 5 weeks.

Movements. Sedentary; some local movements at the edges of range are related to climatic pressures.

Status and Conservation. Not globally threatened. CITES II. Abundant throughout most of range, benefiting from agriculture and cereal cultivation; only in S, where sympatric with closely related *P. eximius*, is it patchy in numbers.

Bibliography. Blakers *et al.* (1984), Bravery (1970), Cain (1955), Cannon (1979b, 1981, 1983, 1984b, 1984d), Christidis & Boles (1994), Forshaw (1981b), Gill (1970), Lindsey, T.R. (1992), Macdonald (1988), Ovenden *et al.* (1987), Pizzey & Doyle (1980), Roberts & Ingram (1976), Schodde & Tidemann (1986), Simpson & Day (1996), Tronson & Tronson (1987), Vriends (1979), Wyndham & Cannon (1985).

88. Eastern Rosella

Platycercus eximius

French: Perruche omnicolore

German: Rosella

Spanish: Perico Multicolor

Other common names: Golden-mantled/White-cheeked Rosella

Taxonomy. *Psittacus eximius* Shaw, 1792, New South Wales.

Forms a superspecies with *P. venustus* and *P. adscitus*, and sometimes considered conspecific with both. Three subspecies recognized.

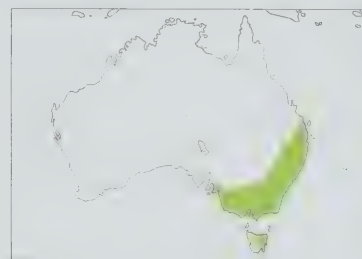
Subspecies and Distribution.

P. e. ceciliae Mathews, 1911 - SE Queensland and NE New South Wales.

P. e. eximius (Shaw, 1792) - SE New South Wales, Victoria and SE South Australia.

P. e. diemenensis North, 1911 - Tasmania.

Introduced to New Zealand (probably *eximius*).



Descriptive notes. 30 cm; 90-120 g. Bill whitish, with white lower cheeks and chin; rest of head and breast red, upper belly yellow, lower belly pale green, undertail-coverts red; mantle, back and scapulars black edged yellow, creating scaled effect; median wing-coverts black, lesser wing-coverts, outer secondary coverts and flight-feathers edged grey-blue; tail bottle green centrally, with outer feathers blue-grey tipped white. Female has duller red head and pale underwing stripe. Immature like female with green to back of head. Race *ceciliae* has darker red head, richer yellow on back, blue-green rump; *diemenensis* has larger cheek patches, darker red head.

Habitat. Lightly wooded landscapes including savanna woodland, mallee, open forest, riverine growth, farmland, gardens and parks, up to 1250 m; preference in Victoria for *Banksia* woodlands and *Eucalyptus camaldulensis* associations.

Food and Feeding. Wide range of plant species used, with 82 recorded in one study. Seeds of *Eucalyptus* and *Acacia* are particularly favoured, with seeds of many shrubs and grasses also taken, e.g. *Capsella bursapastoris*, *Cerastium vulgatum*, *Melilotus alba*, *Onopordon acanthium*, *Carduus marianus*, *Hypochaeris radicata*, *Actinotus helianthi*, *Amaranthus* and *Oxalis*: sometimes extracts seeds from dung. Other food recorded includes berries of *Pyracantha* and *Crataegus*, eucalypt blossoms, *Populus* leaf-buds, *Gazania* leaves, insects and their eggs and larvae, *Schedorhiza* psyllids (animal material notably in Jul); commonly takes spilt grain in farmyards and at roadsides, and can be a pest in orchards.

Breeding. Aug-Feb, occasionally Apr-May. Nest in hollow limb or hole in tree, generally a eucalypt, or in stump, fence post, fallen log, rabbit burrow, enlarged tunnel of Rainbow Bee-eater (*Merops ornatus*), disused hole of Laughing Kookaburra (*Dacelo novaeguineae*) in an arboreal termitarium, elkhorn fern on side of house, rock face, buildings and even a deserted nest of a babbler (*Pomatostomus*). Eggs 4-9, usually 5; incubation lasts 19 days; nestling period c. 35 days.

Movements. Sedentary.

Status and Conservation. Not globally threatened. CITES II. Extremely common in most of range, but only locally numerous in Tasmania. Has benefited from clearance of forested areas for pasture and cereal cultivation.

Bibliography. Baldwin (1976), Blakers *et al.* (1984), Brereton & Pidgeon (1966), Cain (1955), Cannon (1979b, 1981, 1983, 1984b, 1984d), Carter (1996), Chambers (1989), Christidis & Boles (1994), Cooper, R.P. (1975), Emison & Porter (1978), Emison, Beardsell *et al.* (1987), Emison, Norris & Apps (1978), Forshaw (1981b), Green & Swift (1965), Hamel (1970), Kloot & McCulloch (1993), Lane (1994), Lea & Gray (1935), Lever (1987), Lindsey, T.R. (1992), Macdonald (1988), Ovenden *et al.* (1987), Parker (1988), Pfeffer (1997b), Pizzey & Doyle (1980), Rakos (1992b), Robertson (1985), Rose (1997b), Rostron (1969), Satterthwaite (1993), Schodde & Tidemann (1986), Simpson & Day (1996), Tronson & Tronson (1987), Tzaros (1992, 1993), Vriends (1979), Wyndham & Brereton (1982), Wyndham & Cannon (1985), Wyndham *et al.* (1983).

89. Western Rosella

Platycercus icterotis

French: Perruche à oreilles jaunes

German: Gelbwangenrosella

Spanish: Perico Carigualdo

Other common names: Stanley Parakeet

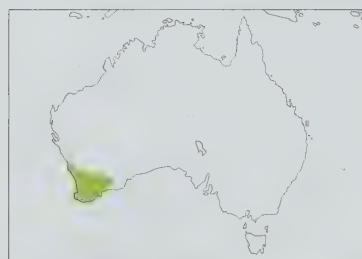
Taxonomy. *Psittacus icterotis* Kuhl, 1820, Albany, south-western Australia.

Two subspecies recognized.

Subspecies and Distribution.

P. i. xanthogenus Salvadori, 1891 - interior SW Australia.

P. i. icterotis (Kuhl, 1820) - coastal SW Australia.



Descriptive notes. 25-26 cm; 52-80 g. Bill whitish; head and underparts red except for ear-coverts and face below eye yellow, and some green barring on flanks; nape, mantle and scapulars black with red edges, becoming pale green edges with red tips lower down, giving a scaled effect; inner wing-coverts dull green, outer dark blue, black on median coverts; primaries blackish; rump and tail dark green with outer feathers blue tipped white. Female has largely green head with red on forehead, smaller, duller yellow facial patch, much green in breast and no red in mantle; pale underwing stripe. Immature like female with no yellow in

face and little red in underparts. Race *xanthogenus* has paler yellow face, buff not green in back scaling, rump dull green to greyish olive and tail dull blue.

Habitat. Open forest, tree-lined cereal fields, riverine growth such as jarrah (*Eucalyptus marginata*), *Banksia* and tea-tree thickets, *Acacia*-*Casuarina* scrublands, grasslands and orchards.

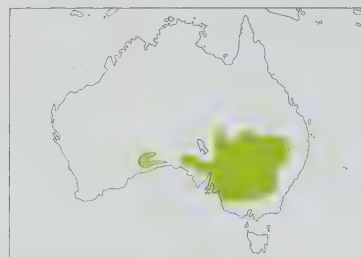
Food and Feeding. Seeds of grasses and herbs, with birds visiting stubblefields to pick up grain; fruits, berries, flowers of *E. marginata*, coating of zamia palm (*Macrozamia reidii*) seeds and ripening apples also recorded, and some damage may be done in orchards.

Breeding. Aug-Dec. Nest in hollow limb or hole in tree, commonly in salmon gum (*E. salmonophloia*) and wandoo (*E. wandoo*). Eggs 3-7, usually 5; incubation lasts 19 days; nestling period c. 5 weeks.

Movements. Generally sedentary, but in Moora district birds arrive in Dec to breed and depart in Jun-Jul.

Status and Conservation. Not globally threatened. CITES II. Relatively common and has benefited from clearance of closed forest. However, numbers may be naturally depressed by *Barnardius zonarius*, a larger competitor for the same food resources. Moreover, poor regeneration of nest-trees is a long-term cause for concern, and there have been local declines and losses. The species is protected by law, but in two shires an open season has existed to control crop depredations.

Bibliography. Blakers *et al.* (1984), Cain (1955), Forshaw (1981b), Garstone (1974), Hall (1974), Lindsey, T.R. (1992), Loaring (1952), Long (1984, 1985), Macdonald (1988), Masters & Milhinch (1974), Mawson & Long (1994), Orton & Sandland (1913), Ovenden *et al.* (1987), Pizzey & Doyle (1980), Richardson & Wooller (1990), Saunders & Ingram (1995), Schodde & Tidemann (1986), Serventy & Whittell (1976), Simpson & Day (1996), Stoneman *et al.* (1997), Trounson & Trounson (1987), Vriends (1979).



wing stripe. Immature like female with smaller red belly patch. Race *haematorrhous* has greenish turquoise bend of wing, rufous-red wing-coverts, red from belly to vent; *pallascens* like nominate but paler below; *narethae* has blue forehead, buff flecks on breast, olive upperparts, belly yellow with red undertail-coverts, red outer lesser wing-coverts.

Habitat. Arid and semi-arid open woodlands dominated by *Myoporum*, *Casuarina*, *Callitris*, *Acacia* and *Eucalyptus*, often with low chenopod shrub layer; also open grassy plains, arid scrub, trees bordering water-courses, sometimes near farm buildings, water troughs. Remnant patches of mallee in cleared agricultural land are important in S of range.

Food and Feeding. Seeds of herbs, including *Atriplex vesicarium*, *Kochia sedifolia*, *Bassia* and *Amaranthus*, fruit, berries and acacia blossoms; relatively little grass seed. Race *narethae* recorded taking seeds of various *Acacia*, also *Heterodendron oleifolium*, *Danthonia caespitosa*, *Helipterum*, *Sonchus oleraceus* and the mistletoes *Amyema quandong* and *Lyiana exocarpi*, and lepidoptera larvae extracted from acacia trunks; reported also to prefer seeds of composites, mainly *Helipterum*, when feeding young.

Breeding. Jul-Dec, with some variation depending on rains, and evidence of two seasons following good rainfall. Nest in hollow in tree; *narethae* often uses very stunted trees, finding the nest-site at ground level in a fissure in the tree base, with western myall (*Acacia papyrocarpa*) a favoured species. Eggs 4-7; incubation lasts 19 days; nestling period c. 30 days.

Movements. Seasonal fluctuations in numbers of the race *narethae* appear to occur, suggesting local movements in response to food availability, but otherwise no evidence of movements.

Status and Conservation. Not globally threatened. CITES II. Fairly common except at edges of range. Clearance of native vegetation in Victoria needs to be halted to preserve shelter and nest-sites, but spread of European Starling (*Sturnus vulgaris*) into these habitats may result in parrots being excluded from nest-holes anyway. Race *narethae* suffers from illegal trapping, involving the cutting-out of nest cavities, which destroys the future potential of the site and therefore reduces the species's overall reproductive capacity; moreover, rabbit grazing may have been preventing regeneration of favoured nest tree species.

Bibliography. Antram (1991), Blakers *et al.* (1984), Boehm (1952), Brooker *et al.* (1979), Cain (1955), Calaby (1958), Emison (1992), Emison *et al.* (1987), Ford (1969), Forshaw (1981a, 1981b), Garnett (1993), Hall (1974), Henderson (1972), Joseph (1985), Lindsey, T.R. (1992), Macdonald (1988), Odekerken (1991), Pizzey & Doyle (1980), Schodde & Tidemann (1986), Simpson & Day (1996), Slater (1978), Storr (1973, 1986), Trounson & Trounson (1987), Vriends (1979), Walton (1993).

Genus *NORTHIELLA* Mathews, 1912

90. Bluebonnet

Northiella haematogaster

French: Perruche à bonnet bleu **German:** Blutbauchsittich **Spanish:** Perico Cariazul

Taxonomy. *Platycercus haematogaster* Gould, 1838, New South Wales.

Sometimes included in *Psephotus* or *Platycercus*. Race *narethae* may be incipient species. Four subspecies recognized.

Subspecies and Distribution.

N. h. haematorrhous (Gould, 1865) - S Queensland and N New South Wales.

N. h. haematogaster (Gould, 1838) - W & S New South Wales and NW Victoria to SE South Australia.

N. h. pallascens (Salvadori, 1891) - inland South Australia.

N. h. narethae (H. L. White, 1921) - SE Western Australia to SW South Australia.

Descriptive notes. 28 cm; 74-105 g. Forehead, lores and face purplish blue; head, breast, mantle, back and rump ochre shading to yellow on belly which has large central red blotch; bend of wing blue with most wing-coverts olive, outermost purplish blue; underwing-coverts and outer webs of flight-feathers purplish blue; tail greenish bronze with outer feathers purplish blue tipped white. Female possesses



ssp haematonotus

ssp caeruleus

PLATE 37

inches 5
cm 13

Genus *PSEPHOTUS* Gould, 1845

91. Red-rumped Parrot

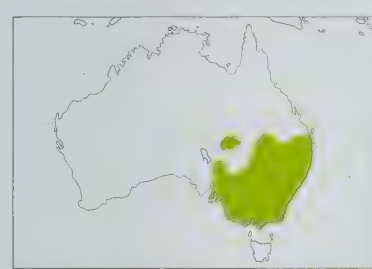
Psephotus haematonotus

French: Perruche à croupion rouge **German:** Singsittich **Spanish:** Perico Dorsirrojo

Taxonomy. *Platycercus haematonotus* Gould, 1838, New South Wales. Sometimes placed in genus *Platycercus*. Two subspecies recognized.

Subspecies and Distribution.

P. h. caeruleus Condon, 1941 - L Eyre region of South Australia and adjacent extreme SW Queensland.
P. h. haematonotus (Gould, 1838) - SE Australia.



Descriptive notes. 27 cm; 54-70 g. Head and breast grass green, with blue tinge on forehead and lower cheeks; belly yellow shading to white on undertail-coverts; mantle, back and scapulars glaucous green, median wing-coverts edged pale yellow, remaining wing-coverts edged pale blue-grey, primaries blackish edged blue; rump red, uppertail-coverts green, tail dark green tipped blackish, outer feathers tipped and edged whitish. Female dull brownish green above, yellowish olive below. Immature similar to female but duller. Race *caeruleus* paler and bluer.

Habitat. Open woodland, mallee, savanna grassland, riverine growth, notably with *Eucalyptus camaldulensis*, and in one locality mangroves; also farmland and urban areas; apparently up to around 1100 m.

Food and Feeding. Seeds and green tissues of grasses and herbaceous plants, e.g. *Erodium botrys*, *Foeniculum*, *Boerhavia*, *Kochia*, *Linum*, *Echinochloa crusgalli*, *Onopordon acanthium*, *Synara cardunculus*, *Echium plantagineum*, *Papaver hybridum* and *Stellaria media*, occasionally in eucalypts on seeds and flowers; also seen feeding on seed-capsules of *Goodenia ovata*, fallen seeds of *Schinus areira*, fruits of *Nitraria*.

Breeding. Aug-Jan, once Apr. Nest in hollow limb or hole in tree, usually a eucalypt near water, but also stumps, fence posts and in farm and suburban buildings, sometimes colonially. Eggs 4-8, usually 5; incubation lasts 19 days; nestling period c. 4 weeks.

Movements. Sedentary, except at edges of range, where local movements occur.

Status and Conservation. Not globally threatened. CITES II. Common to abundant throughout its range. Although at the start of the twentieth century it was reportedly declining owing to overgrazing and a disease outbreak, after mid-century it was found to have expanded its range E and W, apparently in response to forest clearance and cereal cultivation.

Bibliography. Blakers *et al.* (1984), Braby & Runtz (1988), Emison *et al.* (1987), Fleming (1974), Forshaw (1981b), Hall (1974), Klotz (1988), Lea & Gray (1935), Lindsey, T.R. (1992), Macdonald (1988), McLaughlin (1989), Morris (1975), Nielsen (1969), Pizzey & Doyle (1980), Rakos (1992a), Rose (1997b), Schodde & Tidemann (1986), Simpson (1973), Simpson & Day (1996), Tronson & Tronson (1987), Unfried (1997), Vaughan (1980), Vriends (1979), Westcott & Cockburn (1988).

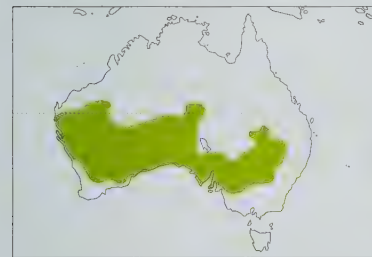
92. Mulga Parrot

Psephotus varius

French: Perruche multicolore **German:** Vielfarbensittich **Spanish:** Perico Variado
Other common names: Many-coloured Parrot

Taxonomy. *Psephotus varius* Clark, 1910, apparently the head of Spencer Gulf, South Australia. Sometimes placed in genus *Platycercus*. Monotypic.

Distribution. SC Australia from extreme W to interior SE.



Descriptive notes. 27-28 cm; 53-70 g. Predominantly bright green, but with yellow frontal band, red hinderown, yellow lesser wing-coverts, dark blue on outer wing-coverts, blackish primaries, belly to undertail-coverts yellow with orange markings, yellowish green band and red patch on rump and uppertail-coverts respectively, tail dark blue washed green, outer feathers blue tipped white. Female much drabber olive-green, becoming paler on belly, with red lesser wing-coverts; pale underwing stripe. Immature like female but duller.

Habitat. Lightly wooded grasslands, mallee, arid scrublands, with range largely coincident

with that of mulga *Acacia aneura*, albeit in no strict association; often in vicinity of waterholes and seasonal creeks.

Food and Feeding. Seeds of grasses, herbs, trees and shrubs, including mulga and *A. tetragonophylla*, mistletoe *Amyma murrai*, the saltbushes *Atriplex vesicaria* and *Enchylaena tomentosa*, chickweed *Cerastium glomeratum*, *Chenopodium*, *Kochia*, *Bassia*, *Erodium* and *Lysiana exocarpi*; small grubs once recorded.

Breeding. Jul-Dec, but nesting extends virtually throughout year if conditions favourable. Nest in hollow limb or hole in tree, high up when tall trees available, but frequently in small, stunted trees, once in a sandbank and once in metal pipes used as posts. Eggs 4-7, usually 5; incubation lasts 19 days; nestling period c. 4 weeks.

Movements. No large-scale seasonal movements occur, with some pairs visiting nest-sites throughout the year. However, some nomadism may occur, if unexplained declines in certain areas prove to reflect natural displacements rather than man-caused disappearances.

Status and Conservation. Not globally threatened. CITES II. Locally common; uncommon in SW Australia. Although some decline in numbers may have occurred since European settlement, there is no evidence of a contraction of range.

Bibliography. Anon. (1997b), Blakers *et al.* (1984), Brooker & Estbergs (1976), Brooker *et al.* (1979), Emison *et al.* (1987), Forshaw (1981b), Hall (1974), Lea & Gray (1935), Lindsey, T.R. (1992), Macdonald (1988), Mack (1970), Moriarty (1972), Pizzey & Doyle (1980), Reid *et al.* (1973), Saunders & Ingram (1995), Schmidt (1978), Schodde & Tidemann (1986), Sedgwick (1952), Simpson & Day (1996), Smith, D. (1993), Smith, J. (1992), Storr (1973, 1977), Tronson & Tronson (1987), Vriends (1979), Würth (1997b).

93. Hooded Parrot

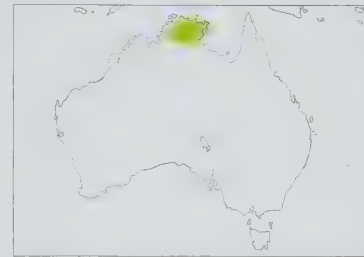
Psephotus dissimilis

French: Perruche à capuchon noir **German:** Colletsittich **Spanish:** Perico Capirotado

Taxonomy. *Psephotus dissimilis* Collett, 1898, Mary River, Northern Territory.

Sometimes placed in genus *Platycercus*. Forms a superspecies with *P. chrysopterygius* and *P. pulcherrimus*; close to former, and in past considered conspecific. Monotypic.

Distribution. NE Northern Territory, Australia.



Descriptive notes. 26 cm; 50-60 g. Similar to *P. chrysopterygius* but with all-black crown from base of upper mandible, darker brown uppersides, larger and brighter yellow wing-patch, red on underparts confined to vent. Female like female *P. chrysopterygius* but more shot with grey, and with emerald green not turquoise blue rump. Immature like female, male somewhat brighter.

Habitat. Open woodlands and savanna grasslands with an abundance of terrestrial termitaria, most nests being placed in ridge country, though some in low *Melaleuca*-dominated floodplains.

Food and Feeding. In early wet season seeds of perennial grasses (23 species of Poaceae) when available, otherwise seeds of herbaceous plants and annual grasses.

Breeding. Jan-Apr or May. Nest mainly in turreted termitaria. Eggs laid at 1-5-2-5 day intervals; average clutch size 4-3, with 50% of eggs laid producing fledglings.

Movements. Birds were formerly recorded as wet season immigrants (Nov-Mar) to Melville I, but unclear if they bred there or not.

Status and Conservation. Not globally threatened. CITES I. Currently considered near-threatened. A BirdLife "restricted-range" species. Decline of species since turn of century correlated with penetration of habitat by cattle, which destroy some nest-sites by rubbing against termitaria, and must also graze out part of the local food supply. However, still generally numerous, and population in one reserve estimated at 12,000 birds. Nest densities range from 0-45 to 0-70/km².

Bibliography. Barnicoat (1996), Blakers *et al.* (1984), Brouwer & Garnett (1990), Carr (1987), Collar & Andrew (1988), Fitzherbert & Baker-Gabb (1988), Forshaw (1981a, 1981b), Garnett (1993), Garnett & Crowley (1995a), Goodfellow (1935), Hutchins (1985), King (1978/79), Lindsey, T.R. (1992), Low (1994b), Macdonald (1988), McAllan (1992), Pizzey & Doyle (1980), Rakos (1991), Reed & Tidemann (1994), Schodde & Tidemann (1986), Simpson & Day (1996), Slater (1978), Tronson & Tronson (1987), Vriends (1979), Wheeler (1975).

94. Golden-shouldered Parrot

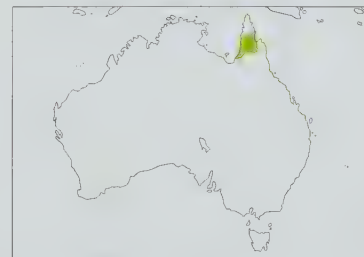
Psephotus chrysopterygius

French: Perruche à ailes d'or **German:** Goldschultersittich **Spanish:** Perico Aligualdo

Taxonomy. *Psephotus chrysopterygius* Gould, 1858, Australia at lat. 18° S, long. 141°30' E.

Sometimes placed in genus *Platycercus*. Forms a superspecies with *P. dissimilis* and *P. pulcherrimus*; close to former, and in past considered conspecific. Monotypic.

Distribution. S parts of Cape York Peninsula in Queensland, Australia.



Descriptive notes. 26 cm; 54-56 g. Forehead pale yellow, mid-crown from above eye black narrowing back to thin stripe down nape to mantle; rest of head and underparts turquoise blue but with green wash on face and broad red patch from belly to undertail-coverts; mantle, back and wing-coverts mid-brown but with median coverts golden yellow, other outer coverts edged blue and primaries blackish edged blue; rump turquoise blue, tail above dark greenish tinged blue, outer feathers tipped white, below pale blue tipped black. Female pale green with pale brownish crown and pale blue on face and lower ventral region; pale

underwing stripe. Immature like female, male somewhat brighter.

Habitat. Open forest dominated by *Eucalyptus* and *Melaleuca* in vicinity of extensive flats with terrestrial termitaria, with preference in breeding season for woodlands adjacent to watercourses, birds subsequently penetrating coastal and estuarine mangroves.

Food and Feeding. Small grass seeds, mainly firegrass (*Schizachyrium*) in the dry season, supplemented by legumes, both native desmodiums and introduced verano (*Stylosanthes hamata*), which are important sources of protein for nestlings; throughout the wet season herbs, sedges, notably *Scleria*, and other grasses, notably *Panicloa nervillema* and *Allotroopsis semialata*, are important.

On following pages: 95. Paradise Parrot (*Psephotus pulcherrimus*); 96. Bourke's Parrot (*Neopsephotus bourkii*); 97. Blue-winged Parrot (*Neophema chrysostoma*); 98. Elegant Parrot (*Neophema elegans*); 99. Rock Parrot (*Neophema petrophila*); 100. Orange-bellied Parrot (*Neophema chrysogaster*); 101. Turquoise Parrot (*Neophema pulchella*); 102. Scarlet-chested Parrot (*Neophema splendida*); 103. Swift Parrot (*Lathamus discolor*); 104. Budgerigar (*Melopsittacus undulatus*); 105. Ground Parrot (*Pezoporos wallicus*); 106. Night Parrot (*Geopsittacus occidentalis*).

Breeding. Apr-Jun, but second broods sometimes in Jul-Aug. Uses two types of termitaria: merid-ian mounds of *Antitermes laurensis* and conical mounds of *A. scopolus*, the latter being preferred for their greater termoregulation. Eggs 3-6; incubation lasts c. 20 days; nestling period c. 5 weeks.

Movements. Pronounced post-breeding dispersal, with some evidence suggesting this is into coastal areas including mangroves, but probably mostly only local. Little immigration seems to occur into former areas.

Status and Conservation. ENDANGERED. CITES I. A BirdLife "restricted-range" species. Sig-nificant decline and contraction of range since turn of century, the species now occupying a 120 x 225 km strip in centre of original range, and total population at start of breeding season is provi-sionally estimated to be around 2300 birds (including 100 bachelors), rising to around 3500-5000 birds at the end of the breeding period; c. 1500 held in captivity in Australia. Although commonly considered a victim of excessive trapping, the species loses food resources to grazing and dry-season burning of grasslands, and suffers predation by feral cats and disturbance by tourists. Period at start of rains apparently critical, as flush of new grass renders seeds hard of access; fires at this period open up patches of ground again, and the problem may be that there have been too few fires at the right time, owing to excessive man-caused dry-season burning. Invasion of open grassland areas by ti-trees (*Melaleuca viridiflora*), which is reducing appropriate habitat for the parrots by about 5% per decade, is also a consequence of the altered fire regime.

Bibliography. Blakers *et al.* (1984), Brouwer & Garnett (1990), Cain (1955), Carr (1987), Collar & Andrew (1988), Collar *et al.* (1994), Dunn (1992), Fitzherbert & Baker-Gabb (1988), Forshaw (1981a, 1981b), Garnett (1993), Garnett & Crowley (1994b, 1995b, 1997), Hutchins (1985), King (1978/79), Lindsey, T.R. (1992), Low (1994b), Macdonald (1988), Pizzey & Doyle (1980), Schodde & Tidemann (1986), Silva (1994b), Simpson & Day (1996), Slater (1978), Thomson (1935), Trounson & Trounson (1987), Vriends (1979), Weaver (1982, 1987), Wheeler (1975).

95. Paradise Parrot

Psephotus pulcherrimus

French: Perruche de paradis

German: Paradiessittich

Spanish: Perico del Paraíso

Taxonomy. *Platycercus pulcherrimus* Gould, 1845, Darling Downs, Queensland, Australia. Sometimes placed in genus *Platycercus*. Forms a superspecies with *P. dissimilis* and *P. chrysoterygius*. Monotypic.

Distribution. C & S and possibly N Queensland and N New South Wales (almost certainly ex-tinct).



Descriptive notes. 27 cm. Frontal band red, area round eye yellow, crown to nape black, rest of head and breast turquoise blue with greener tinging on cheeks and central breast; belly to undertail-coverts red; mantle, back and wings mid-brown, darker on primaries, and with median wing-coverts red; rump and uppertail-coverts turquoise blue; tail bronze tinged blue, outer feathers edged bluish white. Female has head and breast buff with pale or-ange edging, dark mid-crown, pale blue un-derparts, reduced red in wing; pale underwing stripe. Immature like female, male with some green on head.

Habitat. Open forest and savanna woodlands with grass ground-cover, especially in broad riverine valleys.

Food and Feeding. Seeds of native grasses, taken on ground.

Breeding. Recorded in Sept, Dec and Mar. Nest a chamber excavated in a terrestrial termitarium, or occasionally in a sandy riverbank. Eggs 3-5.

Movements. No information; presumably sedentary.

Status and Conservation. Almost certainly EXTINCT. CITES I. Demise attributed to burning seeding grass to provide green growth for cattle, combined with the effects of drought, overgrazing, the spread of prickly pears, and possibly also disease, trapping and egg-collecting. Last certainly recorded in 1927.

Bibliography. Blakers *et al.* (1984), Brouwer & Garnett (1990), Carr (1987), Chisholm (1922, 1929), Collar & Andrew (1988), Collar *et al.* (1994), Fisher (1986), Fitzherbert & Baker-Gabb (1988), Forshaw (1981a, 1981b), Fuller (1987), Fullick (1994b), Garnett (1993), Greenway, J.C. (1967), Joseph (1988b), King (1978/79), Lindsey, T.R. (1992), Low (1994b), Macdonald (1988), Pizzey & Doyle (1980), Schmidt (1986), Schodde & Tidemann (1986), Simpson & Day (1996), Slater (1978), Storr (1973), Trounson & Trounson (1987), Vriends (1979).

Genus NEOPSEPHOTUS Mathews, 1912

96. Bourke's Parrot

Neopsephotus bourkii

French: Perruche de Bourke

German: Bourkesittich

Spanish: Periquito Rosado

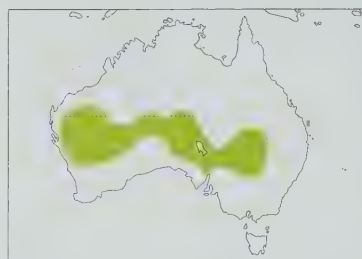
Taxonomy. *Euphema Bourkii* Gould, 1841, Bogan River, New South Wales. Often merged into genus *Neophema*, but recent biochemical data provide additional support for retaining this monotypic genus. Monotypic.

Distribution. W. CS & CE Australia.

Descriptive notes. 19 cm; mean 39 g. Brown with dark edgings on crown, nape and cheeks; slight blue tinging on forehead; area around eyes and base of bill whitish, shading pink on chin; breast brown broadly edged pink, belly rose-pink; flanks, thighs, vent, undertail-coverts and sides of rump pale blue; wing-coverts dark brown edged buff, primaries slate-brown with dull blue outer webs; tail above rust brown, darker distally, with outer feathers pale blue and edged whitish; below whitish. Female has little blue on forehead or pink on belly; has wing stripe.

Habitat. Dry *Acacia* scrubland, especially where mulga (*A. aneura*) is dominant.

Food and Feeding. Seeds of grasses, especially wind grass, and of herbs, taken on ground and in bushes. Also grass shoots, and seeds of *Acacia*, *Bassia* and *Cassia*.



Breeding. Generally Aug-Dec, but variable with rainfall. Nest in hollow in tree, 1-3 m up. Eggs 3-6; incubation lasts 18 days; nestling period c. 4 weeks.

Movements. Nomadic, often remaining in an area for many years and then disappearing.

Status and Conservation. Not globally threat-ened. CITES II. Fairly common and apparently increasing, probably owing to the increase in stock-watering installations, although also perhaps attributable to reduction in sheep num-bers or a change in ground vegetation from saltbush to herbs. A decline in the Murray--Darling and Lake Eyre regions before the

1920's was blamed on the introduction of cats, rabbits and sheep.

Bibliography. Badman (1981), Blakers *et al.* (1984), Cain (1955), Christidis & Boles (1994), Davies (1977), Eckert (1975), Ford (1961), Forshaw (1981b), Greenway, J.C. (1967), Hall (1974), Kennedy (1993), Lindgren (1973), Lindsey, T.R. (1992), Macdonald (1988), Parker (1969), Pizzey & Doyle (1980), Richardson & Wooller (1990), Rothstein (1992), Schodde & Tidemann (1986), Simpson & Day (1996), Storr (1977), Trounson & Trounson (1987), Vriends (1979), Zomer (1987).

Genus NEOPHEMA Salvadori, 1891

97. Blue-winged Parrot

Neophema chrysostoma

French: Perruche à bouche d'or

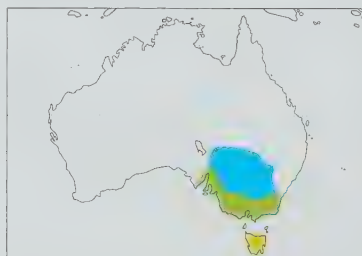
German: Feinsittich

Spanish: Periquito Crisóstomo

Other common names: Blue-winged Grass-parakeet

Taxonomy. *Psittacus chrysostomus* Kuhl, 1820, New Holland; error = Tasmania. Monotypic.

Distribution. SE Australia and Tasmania.



Descriptive notes. 20-21 cm; 44-61 g. Area between eye and bill, and postocular mark, yellow; dark blue line across forehead to front of eye, edged above pale blue; crown bronze shading to olive green on hindcrown and rest of head and upperparts; breast pale grey-green shading to yellow on rest of underparts and undersides of tail except orange tinge to central belly; wing-coverts and flight-feathers dark blue; tail bluish grey, outer feathers tipped yellow. Female has olive green crown and smaller line on forehead, underparts tinged dull green. Immature dull, lacks line on forehead.

Habitat. Eucalypt woodland in breeding season, visiting pastures, clearings and orchards; similar habitat in winter, but also *Acacia* scrubland, lightly wooded grassland, arid saltbush *Atriplex* plains, coastal and mountain heaths, lignum swamps and coastal dunes and saltmarshes.

Food and Feeding. Seeds of grasses, notably *Danthonia semibarbata*, *D. semiannularis*, *Aira caryophylla* and *Drosera peltata*, also *Poa caespitosa*; seeds of herbs including *Cryptostemma calendulaceum*, *Stenopetalum lineare*, *Helipterum jessenii*, *H. pygmaeum* and *Astroloma humifusum*. Birds have been seen digging up newly sown seeds, and invertebrates may also be taken.

Breeding. Oct-Jan. Nest in hole in tree, often a high eucalypt, but also in a stump, fence post or fallen log; sometimes colonial. Eggs 4-6; incubation lasts 18-20 days; nestling period c. 30 days.

Movements. Migratory, although pattern unclear. Most birds in Tasmania move to mainland in winter, and N parts of range only visited at that time; it is suspected that the same birds are in-volved, leap-frogging resident populations in SE Australia and apparently using a geographical loop.

Status and Conservation. Not globally threatened. CITES II. Common, especially in Tasmania, SW Victoria and SE South Australia.

Bibliography. Blakers *et al.* (1984), Cain (1955), Cox (1974), Emison, Beardsell *et al.* (1987), Emison, Norris & Apps (1978), Forshaw (1981b), Green (1969, 1977a, 1977b), Green & McGarvie (1971), Greenway, J.C. (1967), Hall (1974), Lea & Gray (1935), Lindsey, T.R. (1992), Macdonald (1988), McColl (1957), Morris (1989, 1990), Norris *et al.* (1979), Pizzey & Doyle (1980), Schodde & Tidemann (1986), Simpson & Day (1996), Trounson & Trounson (1987), Vriends (1979), Zomer (1987).

98. Elegant Parrot

Neophema elegans

French: Perruche élégante

German: Schmucksittich

Spanish: Periquito Elegante

Other common names: Elegant Grass-parakeet

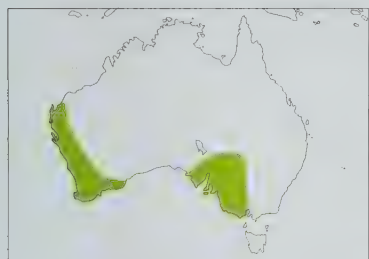
Taxonomy. *Nanodes elegans* Gould, 1837, Tasmania?; error = Victoria. Monotypic.

Distribution. SW & SE Australia, including Kangaroo I.

Descriptive notes. 22-23 cm; 42-51 g. Extremely similar to *N. chrysostoma* but plumage brighter and more yellowish notably on breast, with inner wing-coverts concolorous with mantle, reducing amount of blue in wing, and with outer median coverts pale blue; pale blue upper fringe to line across forehead more prominent and replaces yellow postocular patch; no bronze in crown. Female duller olive-green. Immature like female with reduced line on forehead.

Habitat. Coastal dunes, wooded and shrubby grasslands, mallee, eucalypt woodland, dry *Acacia* scrublands, bluebush flats and saltbush *Atriplex* plains, favouring clumps of trees within cleared areas.

Food and Feeding. Seeds of clover *Trifolium*, *Paspalum* grasses, *Lomandra* and several species of twinleaf *Zygophyllum* recorded.



Breeding. Aug-Nov. Nest in hollow usually high in tree, often in horizontal hollows in high limbs of isolated trees or trees in isolated clumps. Eggs 4-5; incubation c. 18 days; nestling period c. 30 days.

Movements. Partly nomadic, particularly at the edges of range; some small-scale seasonal movements may also occur, but records too few to determine pattern. Records from Kangaroo I are from Nov-Apr, suggesting breeding presence followed by winter period on mainland.

Status and Conservation. Not globally threatened. CITES II. Common, particularly in SW Australia, where since 1930's numbers and

range have increased in apparent response to land clearance and the use of clover *T. subterraneum* in pastures.

Bibliography. Baxter & Parker (1981), Blakers *et al.* (1984), Boehm (1959), Brooker & Estbergs (1976), Cain (1955), Chapple & Lewis (1991), Cox (1973), Forshaw (1981b), Garstone (1974), Greenway, J.C. (1967), Hall (1974), Lea & Gray (1935), Lindsey, T.R. (1992), Macdonald (1988), Masters & Milhinch (1974), Pizzey & Doyle (1980), Saunders & Ingram (1995), Schodde & Tidemann (1986), Serventy & Whittell (1976), Simpson & Day (1996), Trounson & Trounson (1987), Vriends (1979), Zomer (1987).

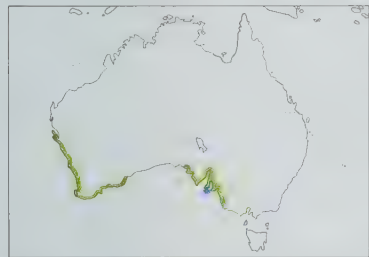
99. Rock Parrot

Neophema petrophila

French: Perruche des rochers German: Klippensittich Spanish: Periquito Roquero

Taxonomy. *Euphema petrophila* Gould, 1841, Western Australia. Monotypic.

Distribution. Coasts and islands of W & S Australia.



Descriptive notes. 22 cm; 47-54 g. Frontal band to eye dark blue vaguely edged pale blue including around eye and on lores; rest of head and upperparts brownish olive, washed greyer on breast and shading to yellow on rest of underparts; outermost median and secondary wing-coverts fringed pale blue; primary coverts and outer webs of flight-feathers dark blue; tail dark bluish olive, laterally edged yellow. Female duller. Immature lacks frontal band, whitish around eye.

Habitat. Coastal dunes, mangroves, saltflats, *Atriplex* shrublands, *Casuarina* woodland, brackish margins and rocky shorelines and

islets.

Food and Feeding. Seeds and fruits of grasses, shrubs and halophytic plants, notably *Carpobrotus aequilatus* and *C. crystallinus*, also *Lepidium foliosum*, *Correa reflexa*, *Atriplex*, *Rhagodia*, *Arthrocnemum arbuscula* and the introduced *Arctotheca nivea*; have been known to enter yards to take spilt wheat.

Breeding. Aug-Dec, rarely Feb; sometimes double-brooded. Nest in crevice in low cliff, rockface or overhang, recently all from islets, mostly limestone, where entrances often hidden behind curtain of vegetation; at one site the entrances of disused burrows of Wedge-tailed Shearwaters (*Puffinus pacificus*) were used, and once the occupied nest of a White-faced Storm-petrel (*Pelagodroma marina*). Eggs 4-5; incubation lasts c. 18 days; nestling period c. 30 days.

Movements. Resident, but with local post-breeding dispersal to other islands and coastal areas; on Kangaroo I birds are only present Jan-May.

Status and Conservation. Not globally threatened. CITES II. Generally common. Apparent gap in range at Great Australian Bight attributed to absence of suitable nesting sites. Moreover, mainland nesting areas are vulnerable to predation by rats, foxes, goannas and cats, so that all recent breeding records have been from offshore islets.

Bibliography. Baxter & Parker (1981), Blakers *et al.* (1984), Cain (1955), Dell & Johnstone (1977), Forshaw (1981b), Greenway, J.C. (1967), Jarman (1974), Lindsey, T.R. (1992), Macdonald (1988), Parker & Cox (1978), Pizzey & Doyle (1980), Saunders & de Rebeira (1985), Schodde & Tidemann (1986), Serventy & Whittell (1976), Simpson & Day (1996), Trounson & Trounson (1987), Vriends (1979), Warham (1955), Winslet (1981), Zomer (1987).

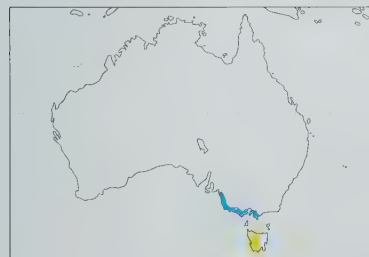
100. Orange-bellied Parrot

Neophema chrysogaster

French: Perruche à ventre orange German: Goldbauchsittich Spanish: Periquito Ventrinaranja

Taxonomy. *Psittacus chrysogaster* Latham, 1790, Tasmania. Monotypic.

Distribution. Coastal strip from SE South Australia to SC Victoria; Tasmania (all breeding now occurs on SW coast). Recorded near Sydney from late 1880's to 1907, with breeding reported.



Descriptive notes. 20-21 cm; mean 42 g. Similar to *N. chrysostoma* but much less yellow in face, crown and upperparts bright green, orange belly patch obvious, and tail green washed blue. Female has weaker, greener line on forehead. Immature duller than female, with smaller orange patch on belly.

Habitat. In breeding season, favoured sites are within 50 m of creekside or lagoon vegetation, where sedgelands adjoin open expanses of matted tussocks or buttongrass, with nesting in small adjacent copses. Birds forage on heath dominated by buttongrass (*Mesomelaena sphaerocephala*), mostly in areas burnt within

the past 15 years. In winter, saltmarsh much used, especially where *Arthrocnemum arbusculum*, *Salicornia quinqueflora* and *Suaeda australis* dominate, but also dunes and, apparently in times of shortage, open scrubland, paddocks, pastures and even golf courses.

Food and Feeding. Initially in summer, seeds of sedgeland plants such as *Lepyrodia tasmanica* and *Restio complanatus*, then seeds of *Boronia citriodora*, *B. parviflora*, *Helichrysum pumilium*, *Actinotus bellidioides* and buttongrass. Formerly birds took decaying kelp and seeds of *Poa billardieri* and berries of *Coprosma*. In early winter, seeds of the saltmarsh halophytes *Suaeda australis* and *Salicornia quinqueflora*, plus at high tide the pasture weeds *Chenopodium glaucum*, *Atriplex hastata* and *Rapistrum rugosum* and sometimes *Halosarcia halocnemoides* and *Frankenia pauciflora*, shifting mid-Jul to *Sclerostegia arbuscula* and later to *Arctotheca calendula*. Seeds of the introduced sea-rocket (*Cakile maritima*) and sheep's burr favoured in dunes.

Breeding. Nov-Dec. Nest in hollows 8-25 m up in living *Eucalyptus nitida* or, less often, *E. ovata*. Eggs 3-6; in captivity, incubation lasts 21 days, nestling period 5 weeks.

Movements. After breeding in SW Tasmania, birds move N in Mar-Apr through Bass Strait islands, notably King I where some birds stop over Apr-Jun and a few remain throughout the non-breeding period, but most wintering from late Mar to early Oct on SE Australian coast between the Coorong and Gippsland, the majority of the tiny population concentrating at Port Phillip Bay and the coastal dunes between Kingston and the Victoria border.

Status and Conservation. ENDANGERED. CITES I. A BirdLife "restricted-range" species. Population in 1990's probably 120 pre-breeding and c. 170 post-breeding. Destruction and alteration of vegetation combined with competition from other species and trapping of birds in winter quarters are blamed for the decline in the species, which was clearly more numerous around 1900 and apparently so even in the 1960's, and which appears to achieve good recruitment on breeding grounds; there is also evidence that disease may have played a role. A recovery programme focusing on winter habitat protection and restoration is under way, with particular input from the petrochemical developers (since 1978) of Point Wilson, in Port Phillip Bay.

Bibliography. Anderson *et al.* (1980), Blakers *et al.* (1984), Brouwer & Garnett (1990), Brown (1988), Brown & Wilson (1981, 1984), Brown, Holdsworth & Rounsevell (1994), Brown, Wilson *et al.* (1985), Cain (1955), Collar & Andrew (1988), Collar *et al.* (1994), Eckert (1990), Emison *et al.* (1987), Forshaw (1981a, 1981b), Garnett (1993), Green & McGarvie (1971), Greenway, J.C. (1967), Hinsby (1947), Hodges (1988), Jarman (1965), Jessop & Reid (1986), King (1978/79), Klau (1994), Lewitzka (1974), Lindsey, T.R. (1992), Low (1994b), Loyn & Panniers (1979), Loyn *et al.* (1986), Macdonald (1988), Male (1995), McColi (1957), Menkhurst (1996), Menkhurst *et al.* (1990), Milledge (1972), Pizzey & Doyle (1980), Schodde & Tidemann (1986), Schulz & Kristensen (1994), Simpson & Day (1996), Slater (1978), Starks (1988, 1993, 1995, 1996), Starks *et al.* (1992), Stephenson (1991), Trounson & Trounson (1987), Zomer (1987).

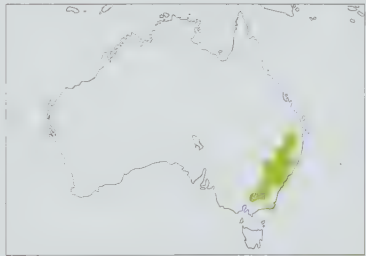
101. Turquoise Parrot

Neophema pulchella

French: Perruche turquoise German: Schönsittich Spanish: Periquito Turquesa
Other common names: Turquoise Grass-parakeet

Taxonomy. *Psittacus pulchellus* Shaw, 1792, New South Wales. Monotypic.

Distribution. SE Queensland to N Victoria, Australia.



Descriptive notes. 20 cm; 37-44 g. Forehead and face blue, shading to green on mid-crown and most upperparts; underparts from throat yellow, with vague orange tinge on belly; inner lesser wing-coverts chestnut-red; median and outer secondary coverts and outer secondaries pale turquoise blue; primary coverts and outer webs of primaries dark blue; tail green, dark at tip and laterally edged yellow. Female has greatly reduced blue on face, with whitish lores, sides of neck and breast green, no chestnut on wing. Immature duller.

Habitat. Open forest, woodland, native grassland, with marked preference for ecotones between open and closed habitats, e.g. heath-forest ecotone and adjacent farmland. In Victoria the species has a positive association with *Eucalyptus albens* which reflects its high use of rocky ridges in winter, moist flats and gullies from spring to autumn, and SE slopes year-round.

Food and Feeding. Generalized diet consisting of seeds, flowers and fruit of both native and introduced plants including grasses, composites, other herbs and shrubs: records include seeds or fruits of *Leucopogon microphyllus*, *Stellaria media*, *Briza minor*, *Hordeum marinum*, four species of *Danthonia*, *Stipa*, *Urtica urens*, *Hypochaeris glabra*, *Carthamus lanatus*, *Dianella revoluta*, *Geranium*, *Sisymbrium*, *Paspalum*, *Pulteneae procumbens*, *Dillwynia retorta*, *Brachyloma daphnoides*, *Hibbertia stricta*, flowers of *Grevillea alpina*, moss spore cases and spilt sorghum by roadsides.

Breeding. Aug-Dec, with one area producing records also in Apr-May, presumably second broods. Nest in hollow in tree (*Eucalyptus* in at least Victoria), stump, fence post or fallen log. Eggs 4-5 (2-6); incubation lasts c. 20 days; nestling period c. 4 weeks.

Movements. Apparently mainly sedentary but with local post-breeding dispersals and irregular local movements probably in response to rainfall. Reappearance in part of former range in 1994-1995 was judged a nomadic response to drought conditions elsewhere rather than a recolonization.

Status and Conservation. Not globally threatened. CITES II. Currently considered near-threatened. A dramatic decline to near-extinction occurred 1880-1920, attributed to the effects of habitat clearance and modification by introduced herbivores (cattle, sheep and rabbits), compounded by the impact of a major drought in 1902 and possibly by trapping; but after 1930 (and particularly after 1970) numbers recovered rapidly, and the species is currently locally common, albeit in disjunct areas. Good numbers in various reserves suggest that grazing indeed seriously disrupts foraging ability; however, the fall and rise in numbers was so sharp that possibly an epidemic was involved. In Victoria a lack of appropriate breeding hollows may be restricting population growth.

Bibliography. Blakers *et al.* (1984), Cain (1955), Chaffer & Miller (1946), Emison *et al.* (1987), Forshaw (1981b), Frith (1952b), Garnett (1993), Greenway, J.C. (1967), Hutchins (1985), Jack (1978), Jarman (1973), King (1978/79), Lindsey, T.R. (1992), López (1993), Macdonald (1988), Morris (1980, 1989), Pizzey & Doyle (1980), Quin (1990), Quin & Baker-Gabb (1993), Quin & Reid (1996), Rakos (1993b), Schodde & Tidemann (1986), Simpson & Day (1996), Slater (1978), Traill (1988), Traill *et al.* (1996), Trounson & Trounson (1987), Vriends (1979), Zomer (1987).

102. Scarlet-chested Parrot

Neophema splendida

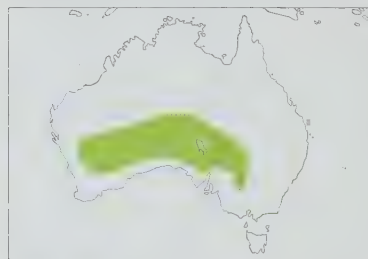
French: Perruche splendide German: Glanzsittich Spanish: Periquito Espléndido

Other common names: Splendid Grass-parakeet, Scarlet-breasted Parrot

Taxonomy. *Euphema splendida* Gould, 1841, Western Australia.

Monotypic.

Distribution. Interior SW to SE Australia.



Descriptive notes. 19 cm; 36–44 g. Similar to *N. pulchella* but with red breast and no chestnut-red wing-patch. Female has paler blue face, with blue lores, breast green. Immature like female.

Habitat. Arid mallee- mulga scrublands, usually with sparse spinifex *Triodia* cover, with preference for recently burnt areas, in one case 3–5 years previously; also open *Eucalyptus gongylocarpa* woodland, *Casuarina cristata* woodland, vegetated ridges and open saltbush *Atriplex* plains.

Food and Feeding. Seeds of *Triodia* greatly favoured, with *Newcastelia dixonii*, *Halarogis*

odontocarpa, *Acacia* and *Stipa* seeds also recorded.

Breeding. Aug–Jan, but variable with conditions, especially rain. Nest in hole in tree, usually a dead part of a eucalypt, 2.5–8 m up; sometimes loosely colonial, or with loose concentrations of pairs in a few hectares. Eggs 3–5, rarely 6; incubation lasts c. 18 days; nestling period c. 30 days.

Movements. Probably nomadic and certainly irruptive, presumably in response to favourable climatic conditions. Some more regular movements may occur: in E South Australia flocks recorded in the period Apr–Aug of several consecutive years, with birds then disappearing, presumably to breed.

Status and Conservation. VULNERABLE. CITES II. Birds are generally rare, but large numbers occur in periodic irruptions, e.g. 1939 and 1966, suggesting that the species is adapted to build up numbers rapidly in favourable conditions, and indeed that it may not be as rare as often thought in the remoter parts of its range. However, changes in vegetation owing to altered fire regimes may have had an effect on abundance, and greater availability of water (for livestock) may have disadvantaged the species against more water-dependent parrots, notably *Neopsephotus bourkii*. No fewer than 25,000 birds are held in captivity in Australia.

Bibliography. Andrew & Palliser (1993), Blakers *et al.* (1984), Brouwer & Garnett (1990), Cain (1955), Collar & Andrew (1988), Collar *et al.* (1994), Fitzherbert & Baker-Gabb (1988), Ford (1971), Forshaw (1981a, 1981b), Garnett (1993), Greenway, J.C. (1967), Henderson (1977), Hutchins (1985), Jarman (1968), Joseph (1976), King (1978/79), Larzelere (1996), Lindsey, T.R. (1992), Low (1994b), Macdonald (1988), Pizzey & Doyle (1980), Pollard (1965), Robinson *et al.* (1990), Schodde & Tidemann (1986), Serventy & Whittell (1976), Simpson & Day (1996), Slater (1978), Storr (1977, 1986, 1987), Tronson & Tronson (1987), Vriends (1979), Zomer (1987).

Genus *LATHAMUS* Lesson, 1830

103. Swift Parrot

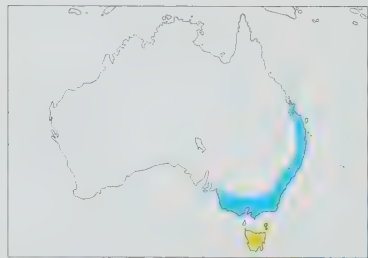
Lathamus discolor

French: Perruche de Latham German: Schwalbensittich Spanish: Periquito Migrador

Taxonomy. *Psittacus Discolor* J. White, 1790, New South Wales.

Monotypic.

Distribution. Tasmania and possibly Flinders I in Bass Strait. Winters in E & SE Australia.



Descriptive notes. 25 cm; 50–74 g. Green, with forehead and front of face, chin and throat red outlined with yellow except for deep blue patch on mid-crown; underwing-coverts, undertail-coverts, shoulder and lesser wing-coverts red, outer secondary coverts tinged blue, primary coverts and primaries dark bluish; some red feathers on flanks, but individually variable; tail dark reddish above, dull grey below. Female similar. Immature duller, with less red.

Habitat. In breeding season eucalypt forest, especially those with blue gum (*Eucalyptus globulus*), but also gardens and parks. In winter remnant open forest areas within agricultural land, parklands and suburbs.

Food and Feeding. Pollen and nectar, especially from *Eucalyptus* blossoms, in particular blue gum, but also *Banksia* and *Xanthorrhoea* flowers, supplemented by insects and their larvae, notably psyllid lerps, fruit, berries and seeds. On mainland dependent on winter flowering eucalypts, notably *E. sideroxylon*, *E. leucoxylon*, *E. albens* and *E. ovata*, and on *E. viminalis* in autumn.

Breeding. Oct–Jan. Nest in hole 7–20 m up in tree, usually a mature or senescent blue gum, often semi-colonially, sometimes with *Neophema chrysostoma*; once in crevice in wall. Eggs 3–5; in captivity, incubation lasting c. 20 days, and nestling period c. 10 weeks.

Movements. Austral migrant, moving to Australian mainland Jan–May, a few birds remaining in Tasmania year-round; on wintering grounds irregularly dispersive and nomadic, following eucalypt flowering and psyllid lerp infestations, except at centre of distribution in S & C Victoria, unless occasional widespread flowering allows large-scale movements throughout winter range.

Status and Conservation. VULNERABLE. CITES II. A BirdLife “restricted-range” species. Abundance of *E. globulus* greatly reduced in Tasmania, and similar loss of mature, productive winter food trees; some illegal trapping has also occurred. Population of 1320 breeding pairs, 1988/1989, with an end-of-season population of over 5000 birds, but forest clearance within range continues and some birds are still trapped illegally for trade, though the species does poorly in captivity.

Bibliography. Blakers *et al.* (1984), Brouwer & Garnett (1990), Brown (1989), Collar *et al.* (1994), Condon (1968), Emison *et al.* (1987), Forshaw (1981b), Garnett (1993), Green (1969, 1977a), Green & McGarvie (1971), Hindwood & McGill (1958), Hindwood & Sharland (1964), Houston (1982), Lendon (1951), Lindsey, T.R. (1992), Macdonald (1988), Pizzey & Doyle (1980), Schodde & Tidemann (1986), Simpson & Day (1996), Storr (1973), Tavistock (1936), Thomas (1970), Tronson & Tronson (1987), Vriends (1979).

Genus *MELOPSITTACUS* Gould, 1840

104. Budgerigar

Melopsittacus undulatus

French: Perruche ondulée German: Wellensittich

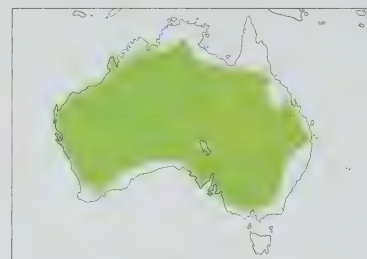
Spanish: Periquito Común

Other common names: Shell Parakeet

Taxonomy. *Psittacus undulatus* Shaw, 1805, New South Wales.

Monotypic.

Distribution. Australia, mainly away from coasts and absent from Cape York Peninsula. Feral in C Florida, USA.



Descriptive notes. 18 cm; 26–29 g. Cere blue, forehead, front of face and throat pale yellow, last with line of black spots; lower malar area purple; mid-crown and area below eye back to nape barred black and pale yellow, broadening to become scalloping on mantle and wing-coverts; underparts, underwing-coverts, lower back and rump light green; tail dull bluish, lateral feathers with a central yellow band. Female has brownish cere. Immature duller with barring on forehead and no black spots on throat.

Habitat. Inhabits a wide variety of open habitats including open forest, savanna, lightly

wooded grasslands, mallee, farmland, riparian growth, dry scrubland and open plains, even penetrating *Alga (Acacia aneura)* deserts; although capable of surviving long periods without water, birds are rarely found far from a source.

Food and Feeding. Grass and chenopod seeds taken on or near ground, the number of species and proportions varying with season and part of range. In inland mid-eastern Australia birds were found to eat only seeds of ground vegetation, from 0.5 to 2.5 mm in length, with up to 39 species involved; at one site *Astrelba* spp. were dominant in the diet, while further inland a wider array was taken, including *Boerhavia diffusa*, *Atriplex* and *Astrelba pectinata*, in the hot months, with *Iseilema* important in the colder period. Occasionally attacks ripening grain crops.

Breeding. Jun–Sept in N of range, Aug–Jan in S, but any time of year after substantial rains, and where conditions permit there may be two breeding seasons in a particular year. Often communal. Nest in hollow in tree, stump, fence post or fallen limb. Eggs 4–6 (up to 8); incubation lasts c. 18 days; nestling period c. 30 days.

Movements. In parts of range areas exist in which seasonal production of food is regular, and others where the supply is stable for extended periods, so some populations relatively predictable on seasonal basis; in far S of range birds only present Sept–Jan. Elsewhere fairly nomadic according to water and seeding grass. In times of drought, birds move wherever conditions are more favourable, but then may be confined to these refuges as the drought intensifies, only recolonizing old areas once rainfall permits it.

Status and Conservation. Not globally threatened. Abundant; in favourable years in certain places flocks darken the sky and the weight of perching birds has broken eucalypt branches 4 cm in diameter. Capable of considerable fluctuations in population levels depending on climatic conditions over several years, and these levels are probably driven as much by short-term breeding success as by immigration. Livestock farming in many parts of interior Australia has required widespread artificial water provision, and some populations appear to have increased permanently as a result. Generally, however, the species is found in small parties, especially at the edges of its range.

Bibliography. Baltz & Clark (1994, 1996), Bird (1990), Blakers *et al.* (1984), Brereton (1977), Brockway (1962, 1964a, 1964b), Bürkle (1997), Cade & Dybas (1962), Chinner (1977), Clark *et al.* (1981), Danielle & Murray (1986), Ferrell & Baptista (1982), Forshaw (1981b), Hinde & Putman (1973), Hutchison (1977), Lea & Gray (1935), Lever (1987), Lindsey, T.R. (1992), Macdonald (1988), Pizzey & Doyle (1980), Richardson & Wooller (1990), Saunders (1995), Schodde & Tidemann (1986), Simpson & Day (1996), Stamps, Clark *et al.* (1985, 1989), Stamps, Kus *et al.* (1990), Tronson & Tronson (1987), Wooller *et al.* (1988), Wyndham (1980a, 1980b, 1980c, 1981, 1983), Zocchi & Brauth (1991).

Genus *PEZOPORUS* Illiger, 1811

105. Ground Parrot

Pezoporos wallicus

French: Perruche terrestre

German: Erdsittich

Spanish: Perico Terrestre

Other common names: Swamp Parrot

Taxonomy. *Psittacus wallicus* Kerr, 1792, New South Wales.

Two subspecies recognized.

Subspecies and Distribution.

P. w. flaviventris North, 1911 - coastal SW Australia.

P. w. wallicus (Kerr, 1792) - coastal SE Australia and Tasmania.

Descriptive notes. 30 cm; mean 130 g. Red frontal band; plain green on face and breast; crown green with black streaks; upperparts green mottled black with yellow buff chevrons and spots; flanks and belly yellowish barred black; tail dull green with yellow notches on outer vanes. Female has pale yellow underwing stripe. Immature lacks red frontal band and face and breast are marked black. Race *flaviventris* has bright yellow on belly with reduced barring.

Habitat. Generally found in coastal graminoid and adjacent montane heathlands up to 1800 m, optimally 5–10 years after burning has taken place in heath dominated by shrubs, 15–18 years after burning in heath dominated by sedges and grass trees. Within heaths, birds frequent drier habitats from mid-autumn to late spring, wetter ones in summer and early autumn, apparently in response to



seed availability. Birds also occur, perhaps only seasonally, in estuarine flats, swampy ground with reed clumps, grasslands and pastures. In Tasmania, buttongrass moorland, consisting of a mosaic of graminoid heathland, scrub and sedgelands.

Food and Feeding. Seeds and green shoots of grasses and herbs, with a preference for buttongrass (*Mesomelana sphaerocephala*) but also *Leptocarpus tenax*, *Anthistiria*, *Paspalum*, *Compressum* and *Xanthorrhoea*. In regurgitated crop samples, 35 different seed types were identified, 16 monocotyledons (e.g. Cyperaceae, Restionaceae), 19 dicotyledons (e.g. Rutaceae,

Eupacridaceae, Fabaceae). Although opportunistic feeder, bulk of diet on Tasmania probably supplied by Restionaceae.

Breeding. Generally Jul-Dec; once Mar. Nest a shallow scrape in soil lined with stalks or leaves, often at the base of a tussock or bush and hidden in a tunnel or chamber of vegetation, in Queensland the key plants being *Empodisma minor*, *Xanthorrhoea fulva* and *Banksia oblongifolia*. Of 20 found, 18 in dry heath, 2 on dry/wet ecotone, and all in areas not burnt for at least 4 years; minimum density was 1-1.3 nests per 10 ha. Eggs 3-4, but up to 6 recorded in Tasmania; incubation c. 21 days; young leave the scrape after 20-28 days, often a little before fully capable of flight. Egg failure high at 22-31%. On average a pair produced 1.9 fledglings per nest.

Movements. Reputedly sedentary, based on view that it is a weak flier, but actually flight is powerful and at least on Tasmania it is likely that altitudinal migration occurs, since higher areas in which birds are recorded are snow-covered in winter. Substantial post-breeding dispersal of young birds occurs, e.g. into marginal unoccupied habitat such as swamps and recently burnt heath; individuals have moved 120 km and some winter records have been far from known breeding areas. However, failure to recolonize some now well-preserved pockets of habitat suggests that little nomadism occurs.

Status and Conservation. Not globally threatened, CITES I. Loss of habitat to urban and agricultural development, including inappropriate burning and establishment of pine plantations, along the seaboard has rendered this species relatively rare, and its range is greatly restricted and discontinuous, with high degree of endangerment in Western and South Australia. Although the population in Tasmania is probably over 100,000 birds, that in SE Australia is much lower, with an estimated 2900 birds in Queensland, and that in SW Australia (entire race *flaviventris*) only 378. Peak densities are 4-6 birds per 10 ha, but only occur 5-8 years after heathland burnt (15 years after burning, few or no parrots are believed to occur); similar situation in Tasmania, though in Western Australia birds favour older heaths, whose much lighter annual rainfall means that recovery after fire is much slower. Thus habitat management involving burning on an 8-10 year cycle is necessary in SE range to prevent invasion of woody plants; and/or the control of grazing to ensure sufficient growth in food-plants and cover. Tasmania now the stronghold. All SW populations (race *flaviventris*) are now within Fitzgerald R and Cape Arid National Parks, but this does not give full protection against fire; an estimated third of the parrot population in the former was lost in a fire in Dec 1989, and both fox predation and habitat deterioration through the spread of soil fungi *Phytophthora* may be causing problems.

Bibliography. Baker & Whelan (1994), Blakers *et al.* (1984), Bryant (1991, 1992, 1994), Burbidge (1997), Burbidge, McNeen *et al.* (1990), Burbidge, Watkins & McNeen (1989), Collar & Andrew (1988), Condon (1968), Emison *et al.* (1987), Forshaw (1981a, 1981b), Garnett (1993), Gosper (1995), Greenway, J.C. (1967), Hinsby (1948), Hodges (1961), Jordan (1988), King (1978/79), Leeton *et al.* (1994), Lindsey, T.R. (1992), Low (1994b), Macdonald (1988), McCall (1957), McFarland (1988, 1991a, 1991b, 1991c, 1991d, 1992), Meredith *et al.* (1984), Pizzey & Doyle (1980), Reid *et al.* (1975), Schodde & Tidemann (1986), Schulz & Kristensen (1994), Serventy & Whittell (1976), Simpson & Day (1996), Slater (1978), Storr (1973), Trounson & Trounson (1987), Watkins (1985), Watkins & Burbidge (1992).

Genus *GEOPSITTACUS* Gould, 1861

106. Night Parrot

Geopsittacus occidentalis

French: Perruche nocturne

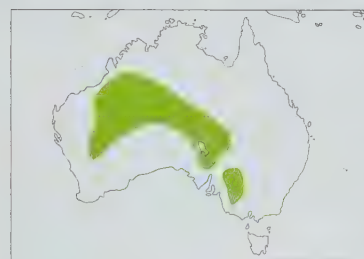
German: Höhlensittich

Spanish: Perico Nocturno

Taxonomy. *Geopsittacus occidentalis* Gould, 1861, West Australia.

Frequently placed in genus *Pezoporus*, and is undoubtedly very closely related. Monotypic.

Distribution. Interior of W & C Australia.



Descriptive notes. 23 cm. Mottled dull green and black above and below, with green ear-coverts and plain yellow belly and undertail-coverts; flight-feathers and tail blackish brown, outer tail feathers with yellowish notches. Immatures reportedly dull and plain.

Habitat. Spinifex (*Triodia*) hummock grassland on stony ridges and rocky breakaways, chenopod low shrub steppe and samphire around dry salt pans; reported pitching into dense lignum (*Muehlenbeckia*) when flushed. Not all recent sightings have been in spinifex plains, which may only be used when seeding; patch burning to create firebreaks, allowing

mature spinifex to develop in a mosaic, appears to have created favourable conditions.

Food and Feeding. Seeds of spinifex found in one specimen. In a recent sighting, circumstance suggests feeding on seeds of *Enneapogon purpurascens*.

Breeding. Nest is a platform of sticks on or near the ground in an enlarged cavity tunnelled into a dense tussock. Eggs reportedly 4.

Movements. Possibly a wanderer, possibly sedentary, perhaps depending on locality or climate; reported in past that numbers fluctuate with season, and the collection of 16 specimens in N South Australia in 1870's may have reflected a local irruption, possibly reflecting favourable climatic conditions or displacement from newly settled stocklands elsewhere. The notion that birds move seasonally between spinifex grassland and chenopod shrublands determined by spinifex seed availability is not borne out by recent records.

Status and Conservation. CRITICALLY ENDANGERED, CITES I. Habitat degradation caused by altered fire regimes and livestock grazing, compounded by predation by introduced cats and foxes and possibly by reduction of water availability due to camels, may all have contributed to the decline of this species, although clearly its nocturnal habits and inhospitable habitat greatly obscure an understanding of both past and present status. Formerly considered extinct. Seven sightings, 1992-1993, indicate small numbers survive. Recent records suggest that sensitive land management, with patch burning of spinifex, moderate livestock densities and low levels of exotic predators, may contribute the conditions under which birds survive.

Bibliography. Andrew, D. (1990), Andrews (1883), Blakers *et al.* (1984), Boles *et al.* (1994), Brouwer & Garnett (1990), Collar & Andrew (1988), Collar *et al.* (1994), Davies *et al.* (1988), Fitzherbert & Baker-Gabb (1988), Forshaw (1981a, 1981b), Forshaw *et al.* (1976), Fullick (1991, 1994a), Garnett (1993), Garnett *et al.* (1993), Greenway, J.C. (1967), Ives (1971), King (1978/79), Leeton *et al.* (1994), Lindsey, T.R. (1992), Low (1994b), Macdonald (1988), McGillp (1931), McKean (1985), Menkhurst & Isles (1981), Pizzey & Doyle (1980), Powell (1970), Schodde & Mason (1980), Schodde & Tidemann (1986), Shuker (1993), Simpson & Day (1996), Slater (1978), Storr (1973, 1977, 1980), Trounson & Trounson (1987), Whitlock (1924), Wilson (1937).

inches 4
cm 10



Tribe PSITTACULINI

Genus *PSITTINUS* Blyth, 1842

107. Blue-rumped Parrot

Psittinus cyanurus

French: Perruche à croupion bleu **German:** Rotachselpapagei **Spanish:** Lorito Dorsiazul
Other common names: Blue-rumped Parakeet

Taxonomy. *Psittacus cyanurus* J. R. Forster, 1795, Malacca.

Three subspecies recognized.

Subspecies and Distribution.

P. c. cyanurus (J. R. Forster, 1795) - S Myanmar and S Thailand S through W Malaysia, Sumatra and Borneo; apparently in Indochina in 19th century.

P. c. abbotti Richmond, 1902 - Simeulue and Sumat, off NW Sumatra.

P. c. pontius Oberholser, 1912 - Mentawai Is., off W Sumatra.

Descriptive notes. 18 cm. Upper mandible red; head lavender blue; underparts greyish olive with a yellow pectoral tuft, shading ventrally to yellowish green; mantle, upper back and primary coverts indigo-black; lower back to uppertail-coverts bright blue; rest of wing green edged yellow; flanks and underwing-coverts red; tail greenish yellow. Female has brownish bill, brown head with coppery crown, yellowish green below and small blue dorsal patch. Immature has grass-green head and body with yellow fringes to wing-coverts, males soon developing red upper mandible. Race *pontius* larger; *abbotti* larger with greenish yellow underparts, green mantle, back and rump, female has green head.

Habitat. Plains-level primary and logged rain forest, forest edge and clearings, oil-palm and coconut plantations, exceptionally mangroves, up to 700 m. Observed mainly in dry forest areas and kerangas, Kalimantan.

Food and Feeding. Poorly documented. Mesocarp of oil-palm fruits extracted individually from the bunch, fruits of *Macaranga rhizinoides* and seeds of *Parkia speciosa*.

Breeding. Nest inspection recorded Nov and Feb, with eggs in May; Jun-Sept in Borneo. Nest in a small natural hole 30 m or more in live forest tree, including *Shorea*. Eggs 3.

Movements. Long-distance, possibly nomadic dispersal suspected: birds may have very large home ranges or else follow seed-flushes opportunistically; evidence of seasonal aggregations in Kalimantan, and apparently only an irregular summer visitor to S Myanmar.

Status and Conservation. Not globally threatened. CITES II. Currently considered near-threatened. Regarded as near-threatened owing to its restriction to lowland forest in Greater Sundas, but ability to exploit oil-palms suggests it is relatively secure. Common in primary habitat, becoming uncommon in disturbed forest and plantations. Widespread in Kalimantan and Brunei, considered scarce by some and not uncommon by others; huge concentrations in Mar recorded in one area. Now sparse in S Thailand doubtless owing to deforestation. As many as 3180 entered trade in 1990, almost all out of Malaysia, with no indication of effects on overall population levels.

Bibliography. Andrew (1992), Anon. (1993), Baker (1934), Chasen & Hoogerwerf (1941), Danielsen & Heegaard (1995), Duckworth & Kelsh (1988), Harris (1993b), Holmes (1996), Holmes & Burton (1987), Jordan (1993), Kidd (1978), Lekagul & Round (1991), MacKinnon & Philipps (1993), Mann (1987), van Marle & Voous (1988), Medway & Wells (1976), Nash & Nash (1988), Round (1988), Smythies (1981, 1986), Sweeney (1996g, 1997b), Thompson (1966), Vuthipong (1992), Ward & Wood (1967).

Genus *PSITTACELLA* Schlegel, 1873

108. Brehm's Tiger-parrot

Psittacella brehmii

French: Perruche de Brehm **German:** Brehmpapagei **Spanish:** Lorito-tigre de Brehm
Other common names: Brehm's Parrot

Taxonomy. *Psittacella Brehmii* Schlegel, 1873, mountainous interior, 4000-5000 feet (c. 1200-1500 m), west coast of Geelvink Bay = Arfak Mountains.

Four subspecies recognized.

Subspecies and Distribution.

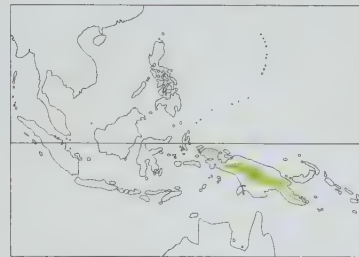
P. b. brehmii Schlegel, 1873 - Vogelkop, NW New Guinea.

P. b. intermixta Hartert, 1930 - Weyland and Snow Mts and Mt Goliath, C Irian Jaya.

P. b. harterti Mayr, 1931 - Huon Peninsula, NE New Guinea.

P. b. pallida A. B. Meyer, 1886 - central mountains of Papua New Guinea.

Descriptive notes. 24 cm; 94-120 g. Bill brownish grey with pale cutting edges; head and throat chocolate brown with vertical yellow line on side of neck; nape, mantle, rump and uppertail-coverts evenly barred black and green; wings dull green with blue leading edge and brownish black flight-feathers; breast to belly lime green; vent and undertail-coverts red; tail green above, brown below. Female lacks yellow line on neck, and has black and yellow barring on upper breast. Immature like female with breast narrowly barred green and dull yellow. Race *intermixta* larger, paler and yellower;



harterti like nominate but head more olive; *pallida* more yellowish, some with a blue wash on belly.

Habitat. Interior of montane *Podocarpus* and *Nothofagus* forest and edge, low scrubby regrowth and vegetation bordering open areas, often descending into grass; generally at 1500-2600 m, but up to 3800 m on Huon Peninsula in absence of *P. picta*.

Food and Feeding. Buds, fruits and leaves of *Homalanthus*, hard berries, small hard seeds, and fruits of *Podocarpus* have been recorded, and lerps suspected as often seen searching leaves.

Breeding. Slight gonadal development in Aug; breeding condition bird in Jan; nestlings May-Jun. **Movements.** No information.

Status and Conservation. Not globally threatened. CITES II. Fairly common and widespread throughout range. Regularly recorded around Tari Gap, Papua New Guinea.

Bibliography. Andrew (1992), Anon. (1994a), Beehler (1978b), Beehler *et al.* (1986), Coates (1985), Diamond (1972a), Frith & Frith (1992), Gilliard & LeCroy (1961), Gyldenstolpe (1955a), Hartert (1930), Hopkins (1992), Mayr & Gilliard (1954), Mayr & Rand (1937), Rand (1942b), Rand & Gilliard (1967), Ripley (1964), Rothschild (1931), Sims (1956).

109. Painted Tiger-parrot

Psittacella picta

French: Perruche peinte **German:** Braunscheitelpapagei **Spanish:** Lorito-tigre Pintado
Other common names: Painted Parrot, Timberline Tiger-parrot

Taxonomy. *Psittacella picta* Rothschild, 1896, Mount Victoria, 5000-7000 feet (c. 1500-2100 m), Owen Stanley Range, New Guinea.

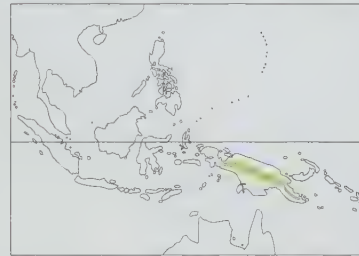
Three subspecies recognized.

Subspecies and Distribution.

P. p. lorentzi van Oort, 1910 - Snow Mts, C Irian Jaya.

P. p. excelsa Mayr & Gilliard, 1951 - montane C Papua New Guinea.

P. p. picta Rothschild, 1896 - montane SE Papua New Guinea.



Descriptive notes. 19 cm; 48-68 g. Bill silver-grey; entire crown rufous-brown, face greyish brown, with yellow collar over neck to sides of throat; throat and upper breast blue shading to green on belly; undertail-coverts red; mantle and back green barred black, shading to yellow barred black on rump; uppertail-coverts red; wings and tail green, duller below. Female has dull greenish blue face surrounded with rufous brown of crown extending on sides of neck to replace yellow collar; breast and upper belly barred yellow and black. Immature like female but head all brown. Race *excelsa* has olive-brown crown; *lorentzi* has blue-green

face, no red on uppertail-coverts.

Habitat. Subalpine shrubby and low substage within forest, preferably adjoining open grassland from which birds are sometimes flushed, from 2500 m to treeline, rarely descending as low as 1370 m.

Food and Feeding. Seeds and small hard berries, fruits of *Dacrydium*. Feeds in small trees and shrubs.

Breeding. Breeding condition birds in Jun and Aug, with juvenile collected in Oct.

Movements. No information.

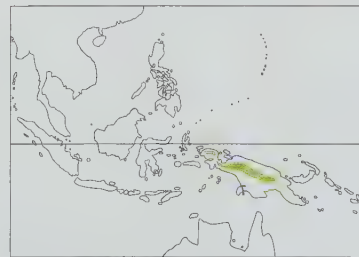
Status and Conservation. Not globally threatened. CITES II. A BirdLife "restricted-range" species. Widespread but generally scarce, though locally common.

Bibliography. Andrew (1992), Beehler (1978b), Beehler *et al.* (1986), Clapp (1986), Coates (1985), Coates & Lindgren (1978), Diamond (1972a), Donaghy (1970), Greensmith (1975), Gregory (1995a, 1995b), Mayr & Rand (1937), Rand (1942b), Rand & Gilliard (1967), Ripley (1964), Sims (1956), Sujatnika *et al.* (1995).

110. Modest Tiger-parrot

Psittacella modesta

French: Perruche modeste **German:** Olivpapagei **Spanish:** Lorito-tigre Modesto
Other common names: Modest Parrot, Barred Little Tiger-parrot



Taxonomy. *Psittacella [sic] modesta* Schlegel, 1873, mountainous interior, 4000-5000 feet (c. 1200-1500 m), west coast of Geelvink Bay = Arfak Mountains.

Three subspecies recognized.

Subspecies and Distribution.

P. m. modesta Schlegel, 1873 - Vogelkop, NW New Guinea.

P. m. subcollaris Rand, 1941 - N slopes of Snow Mts E to C Papua New Guinea.

P. m. collaris Ogilvie-Grant, 1914 - S slopes of Snow Mts.

Descriptive notes. 14 cm; 42-43 g. Head dark brown, darkest on crown, with vague olive-yellow mottling on nape; colour extends onto mantle and shades to paler olive brown on throat and breast, and to green on belly; undertail-coverts red; back, wings and tail dull green, blue on bend of

wing, underwing-coverts yellowish green; underside of tail dusky grey. Female has breast barred orange and dark brown. Immature similar to female. Race *collaris* has yellow mottling on nape developed into irregular collar; *subcollaris* similar but with narrower, brighter collar.

Habitat. Montane forest, second growth and forest edge at 1700-2800 m; commonly seen in scrub adjacent to grasslands. Where overlap with *P. madaraszii* occurs, occupies generally higher elevations.

Food and Feeding. Witnessed feeding on small fruits; seeds and pieces of hard berries in stomachs.

Breeding. Male in breeding condition in Jun. No further information available.

Movements. No information.

Status and Conservation. Not globally threatened. CITES II. A BirdLife "restricted-range" species. Locally common but very unobtrusive.

Bibliography. Andrew (1992), Beehler *et al.* (1986), Campbell (1981), Coates (1985), Diamond, J.M. (1972a, 1985), Frith & Frith (1992), Gilliard & LeCroy (1961), Greensmith (1975), Gregory (1995a, 1995b), Mayr & Rand (1937), Rand (1942b), Rand & Gilliard (1967), Sims (1956), Sujatnika *et al.* (1995).

111. Madarasz's Tiger-parrot

Psittacella madaraszii

French: Perruche de Madarasz **German:** Madaraszpapagei **Spanish:** Lorito-tigre de Madarasz
Other common names: Madarasz's Parrot, Plain-breasted Little Tiger-parrot

Taxonomy. *Psittacella madaraszii* A. B. Meyer, 1886, south-eastern spurs of the Owen Stanley Range, New Guinea.

Four subspecies recognized.

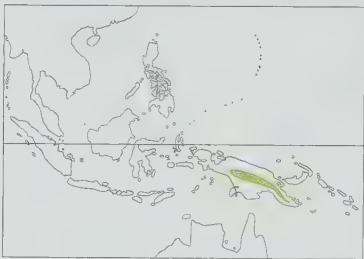
Subspecies and Distribution.

P. m. major Rothschild, 1936 - Weyland Mts and N slopes of Snow Mts, WC New Guinea.

P. m. hallstromi Mayr & Gilliard, 1951 - C New Guinea.

P. m. huonensis Mayr & Rand, 1935 - Huon Peninsula.

P. m. madaraszii A. B. Meyer, 1886 - SE New Guinea.



Descriptive notes. 14 cm; 34-44 g. Very similar to *P. modesta* but head paler and marked yellow on lower face, with yellow mottling of nape never forming a collar and brown of throat merging into green of underparts on breast rather than on belly. Female replaces brown with green, with bluish forehead and black-and-green barring extending from mid-crown to uppertail-coverts, base colour turning orange-red on nape and yellow on rump (one seen with chocolate brown patch from nape to hindneck, no barring, little blue on forehead). Immature like female. Race *huonensis* male has more yellowish crown.

female lacking orange on nape; *hallstromi* male darker and female nape brighter than nominate; *major* slightly larger.

Habitat. Mid-montane forest and its scrubby edges, secondary growth and partly cleared areas, mainly at 1150-2500 m.

Food and Feeding. Fruits, seeds, hard berries and leaf pulp recorded; birds seen feeding at the bases of arboreal ant plants.

Breeding. Breeding condition birds in Jun and Sept.

Movements. No information.

Status and Conservation. Not globally threatened. CITES II. Apparently uncommon, but this perhaps an artefact of its great unobtrusiveness. Regularly recorded below Tari Gap, Papua New Guinea.

Bibliography. Andrew (1992), Anon. (1994a), Beehler (1978b), Beehler *et al.* (1986), Bishop (1987), Coates (1985), Coles (1995), Diamond (1972a), Gregory (1995a, 1995b), Mayr & Rand (1937), Rand & Gilliard (1967), Rowland (1995), Sims (1956).

Genus GEOFFROYUS Bonaparte, 1850

112. Red-cheeked Parrot

Geoffroyus geoffroyi

French: Perruche de Geoffroy **German:** Rotkopfpapagei **Spanish:** Lorito Carirrojo

Taxonomy. *Psittacus Geoffroyi* Bechstein, 1811, New Holland; error = Timor.

Genus has occasionally been merged into *Psittinus*. Proposed races *sumbavensis* and *tjindanae* are synonyms of *floresianus*; *stresemanni* of *rhodops*; *explorator* too may be synonymous with *rhodops*. Sixteen subspecies recognized.

Subspecies and Distribution.

G. g. cyanicollis (S. Müller, 1841) - N Moluccas.

G. g. obiensis (Finsch, 1868) - Obi group, NC Moluccas.

G. g. rhodops (Schlegel, 1864) - S Moluccas.

G. g. explorator Hartert, 1901 - Seram Laut Is (E of Seram).

G. g. keyensis Finsch, 1868 - Kai Is.

G. g. floresianus Salvadori, 1891 - W Lesser Sundas.

G. g. geoffroyi (Bechstein, 1811) - E Lesser Sundas.

G. g. timorlaensis A. B. Meyer, 1884 - Tanimbar Is.

G. g. pucherani Souacé, 1856 - W Papuan Is and NW New Guinea.

G. g. minor Neumann, 1922 - N New Guinea.

G. g. jobiensis (A. B. Meyer, 1874) - Yapen and Meos Num, Geelvink Bay.

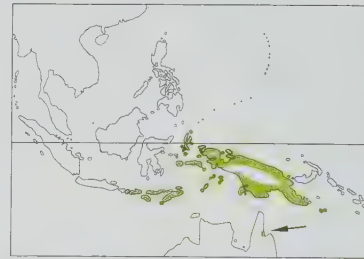
G. g. mysoriensis (A. B. Meyer, 1874) - Biak and Numfor, Geelvink Bay.

G. g. orientalis A. B. Meyer, 1891 - Huon Peninsula (NE New Guinea).

G. g. sudestiensis De Vis, 1890 - Misima and Tagula in Louisiade Archipelago.

G. g. cyanicarpus Hartert, 1899 - Rossel in Louisiade Archipelago.

G. g. aruensis (G. R. Gray, 1858) - Aru Is, S New Guinea, E Papuan islands and extreme N Queens-land.



Descriptive notes. 21-27 cm; 130-180 g. Green above, yellowish green below; upper mandible red, lower black; head red except mid- to hindcrown pale violet blue; dull red stain on median wing-coverts; underwing-coverts blue. Female has entire head dusky brown, with brownish grey bill. Immature has green head with brown tinges, dull bill. Race *floresianus* darker with violet extending onto nape; *cyanicollis* with long blue collar; *obiensis* with wider blue collar, back brownish; *rhodops* large, dark; *explorator* like *rhodops* but female with paler forecrown; *keyensis* large and yellowish, with paler tail; *timorlaensis* similar but smaller;

aruensis like *floresianus* but paler; *orientalis* similar but paler violet crown; *sudestiensis* also similar but yellowish, without brown wing-coverts; *cyanicarpus* with mauve-violet on face, blue edge to wing; *minor* like *aruensis* but back brownish; *jobiensis* similar but back more reddish; *mysoriensis* also similar but violet blue extends over hindneck and red over throat; *pucherani* like *minor* but with little brown on wing-coverts, underwing-coverts dark blue.

Habitat. Lowlands generally to c. 800 m, sometimes higher (e.g. 1400 m, Flores and Lombok), in primary and secondary wet and monsoon forest, being much less frequent in open habitat, but in Lesser Sundas and on a few other islands seems to be commoner in drier open coastal country including savanna woodland, coconut plantations as well as gardens, mangroves, nypa forest, freshwater swamp- and dryland forest and small offshore islands.

Food and Feeding. Seeds, nuts, fruits, berries, flower buds, blossoms all recorded, but seeds within fruit, such as *Eucalyptus papuana*, *Casuarina papuana* and *Alpinia*, appear important; also seen taking fruit of the savanna tree *Antidesma gaisambulla* and *Ganophyllum falcatum*, and mistletoes.

Breeding. Apr-Aug in Lesser Sundas; Feb in NW New Guinea; Oct in NE New Guinea; Apr and Oct-Dec in S New Guinea (probably in most of year throughout island); Aug-Dec in Australia. Nest in hole excavated by female in dead trunk or branch, 4-25 m up; on Sumba keeps apart from nesting associations made by other psittacids; in Australia noted to nest often at forest edge, or in *Melaleuca* or *Pandanus* woodland adjacent to rain forest. Eggs 3; incubation by female; young stay with parents perhaps into second year, possibly assisting at nest.

Movements. Substantial daily flights are made, but no hard evidence of seasonal movements.

Status and Conservation. Not globally threatened. CITES II. Common to abundant throughout much of range; estimated at 30 birds/km² in one area of New Guinea, and at 80 birds/km² on Halmahera. Common on Sumba, Bacan, Obi and the coast of Seram, less so in interior hills, and this diminution of numbers with elevation applies apparently throughout range. Moderate numbers throughout Buru. Population of race *aruensis* in N Australia very restricted and feared likely to suffer from loss of suitable old nest-trees through late dry-season fires.

Bibliography. Beehler *et al.* (1986), Bell (1970b, 1975, 1982), Blakers *et al.* (1984), Bowler & Taylor (1989), Clapp (1987b), Cleland (1968), Coates (1985), Coates & Bishop (1997), Diamond (1972a), Forshaw (1966, 1981b), Garnett (1993), Hoogerwerf (1971), Jepson (1993), Lambert (1994b), Linsley (1995), Low (1997d), MacKinnon *et al.* (1995), Marsden (1995), Mayr (1944b), Mayr & Rand (1937), Milton (1988), Rand (1942a), Rand & Gilliard (1967), Rensch (1931), Rinke (1997b), Smiet (1985), White & Bruce (1986).

113. Blue-collared Parrot

Geoffroyus simplex

French: Perruche à col bleu **German:** Blauhalspapagei **Spanish:** Lorito Acollarado
Other common names: Simple/Lilac-collared Parrot

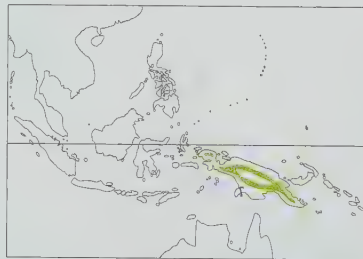
Taxonomy. *Pionias simplex* A. B. Meyer, 1874, Arfak Mountains, 3500 feet (c. 1000 m), New Guinea.

Genus has occasionally been merged into *Psittinus*. Two subspecies recognized.

Subspecies and Distribution.

G. s. simplex (A. B. Meyer, 1874) - Vogelkop (NW New Guinea).

G. s. buergeri Neumann, 1922 - Snow Mts E to Owen Stanley Range, New Guinea.



Descriptive notes. 22 cm; 161 g. Green, more yellowish on underparts, with broad, full but indistinct greyish blue collar; bronze stain on median wing-coverts; underwing-coverts dark blue; tail dusky yellow below; bill grey-black. Female lacks collar but has blue tinge to crown. Immature like female. Race *buergeri* has collar more lilac-coloured, deeper blue underwing-coverts.

Habitat. Mid-montane oak forest at 600-2000 m, favouring drier ridges.

Food and Feeding. Seeds of *Castanopsis* and *Lithocarpus* oaks are particularly favoured, and small seeds found in stomachs, but regularly visits flowering trees presumably for nectar and blossoms.

Breeding. Jan and Oct. Nest recorded in hole 10 m up in large rotten stump, with three young.

Movements. Strongly nomadic, fairly often penetrating lowlands to sea-level, and sometimes ranging up to 2300 m, consistently forming larger flocks than *G. geoffroyi*. Only seen in flocks flying high over Crater Mountain forest.

Status and Conservation. Not globally threatened. CITES II. Generally rather scarce to fairly common, but extremely shy.

Bibliography. Andrew (1992), Beehler (1978b), Beehler *et al.* (1986), Coates (1985), Diamond (1972a), Filewood (1974a), Gregory (1995a, 1995b), Mack & Wright (1996), Pratt (1982), Rand (1942b), Rand & Gilliard (1967).

114. Singing Parrot

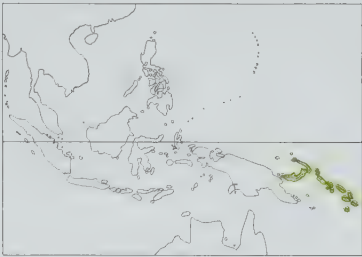
Geoffroyus heteroclitus

French: Perruche hétéroclite **German:** Bismarckpapagei **Spanish:** Lorito Heteróclito
Other common names: Song Parrot

Taxonomy. *Psittacus Geoffroyi heteroclitus* Hombron and Jacquinot, 1841, San Jorge and Ysabel Islands, Solomon Islands.

Genus has occasionally been merged into *Psittinus*. Two subspecies recognized.

Subspecies and Distribution.
G. h. heteroclitus (Hombron & Jacquinot, 1841) - Bismarck Archipelago E to Solomons (except Rennell).
G. h. hyacinthinus Mayr, 1931 - Rennell I.
Descriptive notes. 25 cm; 150-195 g. Upper mandible yellow, lower grey; head yellow, brighter around forehead shading duller on nape, and bordered by a broad, full dove-grey collar; rest of body green, more yellowish on underparts, but with reddish stain on median wing-coverts, deep blue on underwing-coverts and underside of tail dusky yellow. Female has crown and face olive-grey, grey upper mandible, rest of body as in male. Immature like female but crown pale grey. Race *hyacinthinus* has broader grey collar, blue in bend of wings and primaries.
Habitat. Lowland forest and edge preferred, but also uses second growth, partly cleared areas, coconut plantations, parks and gardens up to 600 m, although mountain overflights may be much higher, and found at 900 m, Guadalcanal and San Cristobal, 1760 m in S New Ireland.
Food and Feeding. Small seedy fruit recorded in stomachs. According to local reports, Bougainville, both wild and cultivated (unripe) bananas *Musa* are staple.
Breeding. Oct, but with female feeding juvenile in Aug. Nest in hole in dead limb of cultivated breadfruit (*Artocarpus altilis*); use of dead stump also recorded.



Greensmith (1975), Hadden (1981), LeCroy & Peckover (1983), Mayr (1945b), Orenstein (1976), Schodde (1977), Virtue (1947), Webb (1992, 1997).

Movements. No information. High flights between localities may occur on a daily basis.
Status and Conservation. Not globally threatened. CITES II. A BirdLife “restricted-range” species. Apparently now very uncommon, New Britain and New Georgia, although common in the former in 1920’s. Locally common on Santa Isabel and Guadalcanal, and uncommon to moderately abundant, Bougainville. Highly secretive behaviour may mask true abundance.
Bibliography. Beehler (1978a), Blaber (1990), Bradley & Wolff (1956), Buckingham *et al.* (1995), Cain & Galbraith (1956), Coates (1985), Donaghho (1950), Eastwood (1995c), Gilliard & LeCroy (1967a),



PLATE 39

inches 6
cm 15

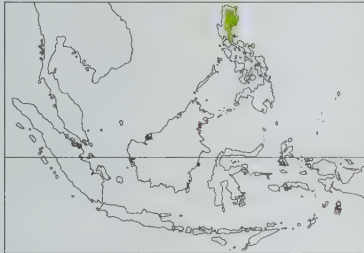
Genus *PRIONITURUS* Wagler, 1832

115. Montane Racquet-tail

Prioniturus montanus

French: Palette momot **German:** Motmotpapagei **Spanish:** Lorito-momoto Montano
Other common names: Mountain/Crimson-spotted/Luzon/Red-crowned Racquet-tail/Racquet-tailed Parrot

Taxonomy. *Prioniturus montanus* Ogilvie-Grant, 1895, mountains of Lepanto, Luzon. Forms a superspecies with *P. waterstradti*, *P. platenae* and debatably *P. verticalis*. Frequently united with *P. waterstradti*; less commonly with *P. verticalis* too. Monotypic.
Distribution. Luzon (N Philippines).



Descriptive notes. 30 cm; 102-142 g. Bill pale greyish; dull green on upperparts, yellowish green below; forehead and face blue, shading to green on lower cheeks and rear ear-coverts; mid-crown red; tail spatules blackish. Female has entire head green but for blue tinges. Immature like female without spatules.
Habitat. Primary montane forest above 700 m.
Food and Feeding. Fruits of a fine-leaved tree growing low inside forest appears to be the only record.
Breeding. Aug-Sept; but juvenile collected Jul. Nest recorded 5-6 m up in tall oak stub.
Movements. Partial displacements from the

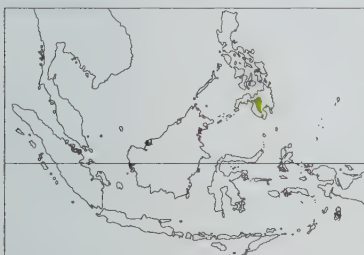
highlands may occur with some regularity.
Status and Conservation. **VULNERABLE.** CITES II. A BirdLife "restricted-range" species. Although common in both the Cordillera Central and the Sierra Madre, the combination of habitat loss, hunting and trapping for the cagebird trade is predicted to inflict serious damage on populations.
Bibliography. Collar *et al.* (1994), Danielsen *et al.* (1994), Delacour & Mayr (1946), Dickinson *et al.* (1991), DuPont (1971), Inskipp *et al.* (1996), McGregor (1909-1910), Morioka & Sakane (1979), Poulsen (1995), Rabor (1955), Salomonsen (1953), Sargeant (1992).

116. Mindanao Racquet-tail

Prioniturus waterstradti

French: Palette de Mindanao **Spanish:** Lorito-momoto de Mindanao
German: Mindanao-Spatelschwanzpapagei

Taxonomy. *Prioniturus waterstradti* Rothschild, 1904, Mount Apo, 3000 feet (c. 1000 m), Mindanao. Forms superspecies with *P. montanus*, *P. platenae* and debatably *P. verticalis*. Often considered conspecific with *P. montanus*. Monotypic.
Distribution. Mountains of Mindanao (SE Philippines).



Descriptive notes. 27 cm. Similar to *P. montanus* but with less extensive blue on face and no red patch on crown, brown tinge to mantle and back. Female similar. Immature lacks spatules.
Habitat. Dense montane forest, ridgetop forest, and (at higher elevations) stunted mossy forest; 820-2700 m, and generally above 1000 m.
Food and Feeding. No information.
Breeding. No information.
Movements. Considerable vertical movements reputedly take place each day, but no other kind appears to have been reported.

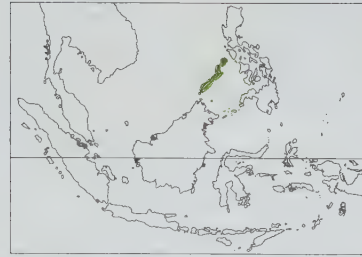
Status and Conservation. **VULNERABLE.** CITES II. A BirdLife "restricted-range" species. The species was abundant in the first half of this century, but had become local and uncommon, apparently occurring at lower density than some of its congeners, by the early 1990's. However, in Mt Katanglad National Park it remains fairly common on Mts Imbayao, Nangkabulos and Dulang-dulang.
Bibliography. Collar *et al.* (1994), Delacour & Mayr (1946), Dickinson *et al.* (1991), DuPont (1971), Hachisuka (1930), Heaney *et al.* (1993), Inskipp *et al.* (1996), McGregor (1909-1910), Mearns (1909), Meyer de Schauensee & DuPont (1962), Rand & Rabor (1960), Ripley & Rabor (1961), Salomonsen (1953), Sargeant (1992), Wheatley (1996).

117. Blue-headed Racquet-tail

Prioniturus platenae

French: Palette de Palawan **Spanish:** Lorito-momoto de Palawan
German: Palawan-Spatelschwanzpapagei
Other common names: Palawan Racquet-tail

Taxonomy. *Prioniturus platenae* A. W. H. Blasius, 1888, Palawan. Forms a superspecies with *P. montanus*, *P. waterstradti* and debatably *P. verticalis*. Previously treated as a race of *P. discurus*. Monotypic.
Distribution. Palawan and associated islands (SW Philippines).
Descriptive notes. 27 cm. Pale greyish yellow bill; entire head and nape light blue extending onto breast, becoming greener on lower breast and belly and yellow on vent; upperparts dull green;



spatules dark green. Female has blue confined to crown and sides of head. Immature similar, with no spatules.
Habitat. Lowland forest and edges, and adjacent cultivations, apparently in the lowlands to around 300 m.
Food and Feeding. No observations; nuts in stomachs of specimens.
Breeding. Birds labelled juvenile have been collected in Jan (two) and Aug, and one labelled immature in May.
Movements. No information.
Status and Conservation. **VULNERABLE.** CITES II. The paucity of recent records of the

Blue-headed Racquet-tail indicates that it is now generally uncommon and declining, although it is regularly recorded in St Paul's Subterranean National Park.
Bibliography. Baud (1978), Collar *et al.* (1994), Dickinson *et al.* (1991), DuPont (1971), Inskipp *et al.* (1996), Lowe (1916), McGregor (1909-1910), Salomonsen (1953), Sargeant (1992), Wheatley (1996).

118. Green Racquet-tail

Prioniturus luconensis

French: Palette verte **German:** Luzon-Spatelschwanzpapagei **Spanish:** Lorito-momoto de Luzón
Other common names: Green-headed/Green-crowned Racquet-tail/Racquet-tailed Parrot

Taxonomy. *Prioniturus luconensis* Steere, 1890, Marinduque and Luzon. Forms a superspecies with *P. discurus*, probably *P. flavicans* and debatably *P. verticalis*. Monotypic.
Distribution. Luzon and Marinduque, N Philippines.



Descriptive notes. 29 cm. Bill pale greyish; yellowish green on head and underparts, slightly darker on wings and tail, with spatules blackish and lateral feathers above dark blue tipped black. Female less yellowish. Immature lacks spatules.
Habitat. Canopy of primary forest and edge, occasionally foraging out in open cultivated areas, in lowlands and foothills, e.g. in Sierra Madre at 300-700 m. Recorded recently from selectively logged and degraded forest, but ability to persist in such habitat unclear.
Food and Feeding. Fruit, particularly bananas, flowers and seeds of growing corn, and rice.

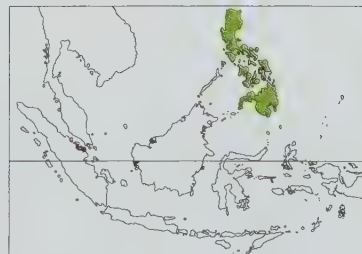
Breeding. Young obtained in May.
Movements. No information.
Status and Conservation. **ENDANGERED.** CITES II. A BirdLife "restricted-range" species. Combination of habitat loss and trade has rendered this species very uncommon and local, with a single good population protected, at Subic Bay Naval Forest Reserve; it is very rare in Quezon National Park.
Bibliography. Collar & Andrew (1988), Collar *et al.* (1994), Danielsen *et al.* (1994), Delacour & Mayr (1946), Dickinson *et al.* (1991), DuPont (1971), Gilliard (1950b), Gonzales & Rees (1988), Hachisuka (1934), Inskipp *et al.* (1996), McGregor (1909-1910), Poulsen (1995), Salomonsen (1953), Sargeant (1992), Wheatley (1996).

119. Blue-crowned Racquet-tail

Prioniturus discurus

French: Palette à couronne bleue **Spanish:** Lorito-momoto Coroniazul
German: Philippinen-Spatelschwanzpapagei
Other common names: Blue-headed Racquet-tail(!)

Taxonomy. *Psittacus discurus* Vieillot, 1822, Mindanao. Forms a superspecies with *P. luconensis*, probably *P. flavicans* and debatably *P. verticalis*. Sometimes considered conspecific with *P. flavicans*, and previously with *P. platenae*. Proposed race *nesophilus* of Catanduanes I is synonym of *whiteheadi*. Three subspecies recognized.
Subspecies and Distribution.
P. d. whiteheadi Salomonsen, 1953 - Luzon S to Bohol, N & CE Philippines.
P. d. mindorensis Steere, 1890 - Mindoro, NC Philippines.
P. d. discurus (Vieillot, 1822) - Mindanao, Basilan, Sulu and Olutanga, SE & SC Philippines.



Descriptive notes. 27 cm; 86-176 g. Crown to hindneck pale blue; rest of face to chin and nape apple green; underparts yellowish green; back and wings darker green; undersides of flight-feathers greenish blue; tail dark greenish, spatules blackish, lateral feathers blue edged green and tipped black. Female has shorter spatules. Immature duller, with reduced blue on crown, lacks spatules. Race *whiteheadi* has less extensive blue on crown; *mindorensis* has green forehead, deeper blue on rest of crown.
Habitat. Primary and secondary forest up to 1750 m; also mangroves, orchards and banana plantations.
Food and Feeding. Poorly documented; apparently fond of bananas, inflicting damage on unripe crops adjacent to forest. Repeated presence in *Ficus*, Sibuyan, suggests use as food.
Breeding. Apr-May; pair "billing" in Feb, Mindanao. Nesting reputedly colonial in tall dead trees. Eggs 3.
Movements. Birds arrived on Calicoan, off S Samar, after breeding, becoming commoner into Sept-Oct; no other information suggests migratory behaviour.

Status and Conservation. Not globally threatened. CITES II. Generally common even in degraded habitat on largely deforested islands such as Mindoro and Negros; however, not common on Sibuyan; regularly recorded at PICOP logging concession near Bislig, Mindanao.

Bibliography. Brooks *et al.* (1992), Delacour & Mayr (1946), Dickinson *et al.* (1991), DuPont (1971, 1972a), Dutton *et al.* (1992), Evans, Dutton & Brooks (1993), Gonzales (1983), Goodman *et al.* (1995), Inskipp *et al.* (1996), McGregor (1909-1910), Ogilvie-Grant (1906), Parkes (1971a), Potter (1953), Rabor (1977), Rand & Rabor (1960), Ripley & Rabor (1958), Salomonsen (1953), Sargeant (1992).

120. Sulu Racquet-tail

Prioniturus verticalis

French: Palette des Sulu

Spanish: Lorito-momoto de las Sulu

German: Sulu-Spatelschwanzpapagei

Other common names: Blue-winged Racquet-tail

Taxonomy. *Prioniturus verticalis* Sharpe, 1893. Tawi Tawi, Sibutu and Bongao. May belong in superspecies with *P. luconensis*, *P. discurus* and *P. flavicans*, or alternatively with *P. montanus*, *P. waterstradti* and *P. platenae*. Sometimes still treated as conspecific with *P. montanus*. Monotypic.

Distribution. Sulu Archipelago, S Philippines.



Descriptive notes. 30 cm. Similar to *P. montanus* but forehead, sides of head and nape green. Female like female *montanus* but with no blue on face. Immature lacks spatules.

Habitat. Primary lowland forest bird, including mangroves, forest edge adjacent to cleared areas.

Food and Feeding. No precise information.

Breeding. Sept-Jan. Nest recorded in a large broken-off palm tree in a grove of palms close to forest.

Movements. No information.

Status and Conservation. ENDANGERED.

CITES II. A BirdLife "restricted-range" species. Only small numbers observed in Tawitawi in 1991, just six were seen in Aug 1994, and a survey in Jan 1995 missed the species entirely. There is no report from Bongao, Tumindao or Manuk Manka for at least 90 years. The species's last habitat on Tawitawi is about to disappear, and habitat loss on some of the other islands in the Sulus indicates the gravity of the situation. This problem is exacerbated by the human use of large birds, including racquet-tails, for target practice, many men on Tawitawi being armed with high-powered rifles.

Bibliography. Collar *et al.* (1994), Delacour & Mayr (1946), Dickinson *et al.* (1991), DuPont (1971), DuPont & Rabor (1973a), Dutton *et al.* (1992), Inskipp *et al.* (1996), Lambert (1993b), McGregor (1909-1910), Robson (1992), Salomonsen (1953), Sargeant (1992), Wheatley (1996).

121. Yellowish-breasted Racquet-tail

Prioniturus flavicans

French: Palette de Cassin

Spanish: Lorito-momoto Amarillento

German: Flaggenschwanzpapagei

Other common names: Yellow-breasted/Red-spotted/Crimson-spotted Racquet-tail

Taxonomy. *Prioniturus flavicans* Cassin, 1853. Sulawesi.

Probably forms a superspecies with *P. luconensis*, *P. discurus* and debatably *P. verticalis*. Sometimes considered conspecific with *P. discurus*. Monotypic.

Distribution. N half of Sulawesi and associated islands.



Descriptive notes. 37 cm. Bill pale bluish grey; forehead and face green; crown to hindneck rich blue with red patch in mid-crown; breast, sides of neck, nape and mantle dull olive-yellow shading to yellowish green on underparts and to dull green on back and wings and tail, with blackish spatules. Female has blue reduced or even absent, and no red on crown. Immature like female but even less blue, no spatules.

Habitat. Primary lowland forest to around 1000 m, occasionally in stands of trees at forest margins.

Food and Feeding. No information.

Breeding. No information.

Movements. No information.

Status and Conservation. Not globally threatened. CITES II. Currently considered near-threatened. A BirdLife "restricted-range" species. Not as common as *P. platurus* and usually only seen singly or in pairs, but still fairly numerous overall; especially common in Dumoga-Bone National Park. Nevertheless, extensive forest loss in lowland areas within the range of this bird has raised concerns for its long-term prospects.

Bibliography. Andrew (1992), Coates & Bishop (1997), Collar *et al.* (1994), Holmes & Philipps (1996), Inskipp *et al.* (1996), Rozendaal & Dekker (1989), Stresemann (1940), Sujatnika *et al.* (1995), Watling (1983), Wheatley (1996), White & Bruce (1986).

122. Golden-mantled Racquet-tail

Prioniturus platurus

French: Palette à manteau d'or

Spanish: Lorito-momoto Dorsidorado

German: Goldmantelpapagei

Other common names: Gold-backed Racquet-tail

Taxonomy. *Psittacus platurus* Vieillot, 1818. New Caledonia; error = Sulawesi.

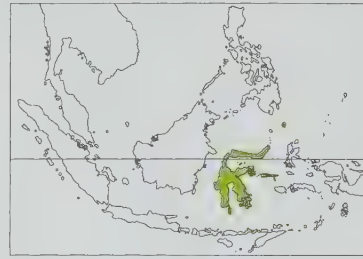
Forms a superspecies with *P. mada*. Three subspecies recognized.

Subspecies and Distribution.

P. p. talautensis Hartert, 1898 - Talaud Is.

P. p. platurus (Vieillot, 1818) - Sulawesi and associated islands.

P. p. sinerubris Forshaw, 1971 - Taliabu in Sula Is.



Descriptive notes. 28 cm. Bill pale greyish; green on head with red spot on hindcrown bordered behind by larger lilac patch; dull orange lateral stripe across mantle; rest of mantle, back and wing-coverts dull grey; central tail feathers green above, with blackish spatules, lateral feathers green with blue edging and black tips; yellowish green on undersides. Female green. Immature like female with no spatules. Race *talautensis* darker with less grey upperparts: *sinerubris* also less grey, smaller, without red spot on crown.

Habitat. Lowland rain forest up to elfin moss forest at 3000 m; perhaps most numerous at 1800-2000 m. Also at forest edge and even at mango trees in villages.

Food and Feeding. Small fruits and seeds taken in interior of forest from substage to lower canopy; fond of cultivated mangoes and reported to visit ripening corn at night.

Breeding. Oct. Nest in hole in limb or tree.

Movements. No regular movements recorded, but birds move daily over large distances in search of food.

Status and Conservation. Not globally threatened. CITES II. A BirdLife "restricted-range" species. Common, occurring in small parties throughout Sulawesi. May have declined mid-century on Muna and Buton islands owing to trapping.

Bibliography. Andrew (1992), van Bemmell & Voous (1951), Bishop (1992), Coates & Bishop (1997), Eck (1976, 1977), Forshaw (1971b), Fraser & Henson (1996), Holmes & Philipps (1996), Rozendaal & Dekker (1989), Seth-Smith (1903), Stresemann (1940), Watling (1983), Wheatley (1996), White & Bruce (1986).

123. Buru Racquet-tail

Prioniturus mada

French: Palette de Buru

German: Madapapagei

Spanish: Lorito-momoto de Buru

Taxonomy. *Prioniturus mada* Hartert, 1900, Mount Mada, 3000 feet (c. 1000 m), Buru.

Forms a superspecies with *P. platurus*. Monotypic.

Distribution. Buru, S Moluccas.



Descriptive notes. 32 cm. Bill bluish grey; face, forehead and ear-coverts rich green; mid-crown to nape, mantle and shoulders purplish, shading on back and wings to olive-green, and in turn to oil green on flight-feathers, rump and tail, spatules dark blackish blue; leading edge of wing blue. Female lacks purple except as stain on hindneck and mantle. Immature like female but lacks spatules.

Habitat. Rain forest, ranging from sea-level up to at least 1750 m; reports of altitudinal preferences now considered to be unsubstantiated.

Food and Feeding. No information.

Breeding. Dec-Feb. Nest in hollow limb or hole in tree. Five young in one nest included one large, fully feathered bird and one small, entirely down-covered hatchling.

Movements. Presumably sedentary.

Status and Conservation. Not globally threatened. CITES II. Currently considered near-threatened. A BirdLife "restricted-range" species. The mountains of Buru remain well forested, there is apparently no trade in this species, and it was common and widespread, including in selectively logged forest, with flocks of 4-10 regularly seen, late 1989.

Bibliography. Andrew (1992), Arndt (1992b), Coates & Bishop (1997), Collar & Andrew (1988), Collar *et al.* (1994), Jepson (1993), Marsden *et al.* (1997), Robson (1990a), Siebers (1930), Stresemann (1913b), Sujatnika *et al.* (1995), Wheatley (1996), White & Bruce (1986).

Genus *TANYGNATHUS* Wagler, 1832

124. Great-billed Parrot

Tanygnathus megalorynchos

French: Perruche à bec de sang **German:** Schwarzschnulterpapagei **Spanish:** Loro Picogordo

Other common names: Large-billed/Moluccan/Island Parrot

Taxonomy. *Psittacus megalorynchos* Boddaert, 1783. New Guinea (= West Papuan Islands?). May form a superspecies with *T. lucionensis*. Nominat race shows much variation, some apparently clinal; now considered to include proposed races *viridipennis*, *djampeae*, *floris*, *obiensis*, *bachianensis*, *fuliginosus* and *insularum*. Five subspecies currently recognized.

Subspecies and Distribution.

T. m. megalorynchos (Boddaert, 1783) - Talaud, Sangihe and islands off N, E & S Sulawesi S to Flores (Lesser Sundas) and E through N & C Moluccas to W Papuan Is and other islands off W Irian Jaya; present also on Balut and Sarangani off Mindanao (SE Philippines), where possibly introduced; specimens from N Sulawesi may have been wanderers or introductions, while sight records remain open to question.

T. m. affinis Wallace, 1863 - S Moluccas.

T. m. sumbensis A. B. Meyer, 1881 - Sumba.

T. m. hellmayri Mayr, 1944 - W Timor and Semau I.

T. m. subaffinis P. L. Slater, 1883 - Tanimbar Is.

Descriptive notes. 33-43 cm. Enormous bill red; head, nape and mantle bright green, shading to pale blue on back and rump and to yellowish on underparts, with yellow flanks, underwing-coverts



and across undersides of flight-feathers; scapulars and lesser wing-coverts black, median wing-coverts black edged yellow; greater wing-coverts and secondaries green edged yellow; primaries blue; tail above green tipped yellow, below yellowish. Immature lacks black at shoulder. Nominate apparently has two types of variation, which has led to establishment of several supererogatory subspecies: in one, margins of flight-feathers are green instead of blue, (hence "*viridipennis*" of Tukangbesi, Madu and Kalaotoa Is, and "*djampeae*" of Tanahjampea and Kalao, all S of Sulawesi); in other, undersides somewhat greener (again in "*djampeae*" and in "*floris*" of Flores). Race *affinis* has bluish tinge to head, green scapulars, lesser wing-coverts greenish blue; *subaffinis* like *affinis* with rump very pale blue, underwing-coverts bluish; *hellmayri* like *affinis* but with yellowish green head, greener wing covert edges; *sumbensis* like nominate but head darker green, underparts greener, rump darker blue.

Habitat. Primary and secondary lowland evergreen forest, preferably with a rather open structure and with a scattering of large deciduous trees, but also *Casuarina* forest, mangroves, plantation edge and garden areas in lowlands. A small-island specialist, being confined on larger islands to coastal areas and adjacent foothills. Birds may go to roost in higher parts of islands, returning early each morning to lowlands.

Food and Feeding. The fruit of *Sonneratia alba* reportedly much favoured, also *Canarium vulgare* and casuarinas; a green lemon-sized fruit reportedly important, the birds travelling from island to island in search of it. Apparently visits corn crops.

Breeding. Nest-sites apparently occupied, Aug-Sept; Aug-Sept on Sumba. Nest in hole in very tall deciduous tree.

Movements. Apparently often travels between adjacent small islands, but this is presumably generally only a very local phenomenon.

Status and Conservation. Not globally threatened. CITES II. Seram may hold 100,000 birds, and the species is still in healthy numbers on Tanahjampea, Flores Sea; Buru has been reckoned to hold c. 7500 birds, but probable numbers now considered much higher. On Ambon (S Moluccas), found to be common in forested hills behind Hila on N coast of Hita Peninsula, in 1995. However, only 1700 birds estimated to remain on Sumba, where the race *sumbensis* is endangered by habitat loss, and on Flores species has suffered a marked decline from the cagebird trade. The species was abundant on Balut and Sarangani in 1906 and was still common on the latter in 1978. Reported international trade, 1985-1990, averaged 1206 birds per year, but the EC prohibited importations in Sept 1991.

Bibliography. Andrew (1992), Anon. (1993), Beehler *et al.* (1986), Bowler & Taylor (1989), Butchart *et al.* (1996), Coates & Bishop (1997), De Dios & Sweeney (1994b), Dickinson *et al.* (1991), Dutton (1995), Hachisuka (1935), Harrison & Holyoak (1970), Jepson (1993), Jones, Juhaeni *et al.* (1994), Jones, Linsley & Marsden (1995), Lever (1987), Low (1989a), MacKinnon (1988), MacKinnon & Phillips (1993), Marsden (1995), Mayr (1944b), Mees (1965, 1982b), O'Connor (1994), Rand & Gilliard (1967), Siebers (1930), Smiet (1985), Tabaranza & Alconcel (1979), Thompson (1993), White & Bruce (1986).

125. Blue-naped Parrot

Tanygnathus lucionensis

French: Perruche de Luçon **German:** Blaunackenpapagei **Spanish:** Loro Nuquiazul
Other common names: Blue-crowned Parrot

Taxonomy. *Psittacus lucionensis* Linnaeus, 1766, Luzon.

May form a superspecies with *T. megalorhynchus*. Four subspecies recognized.

Subspecies and Distribution.

T. l. lucionensis (Linnaeus, 1766) - Luzon and Mindoro, N Philippines.

T. l. hybridus Salomonsen, 1952 - Polillo, N Philippines.

T. l. salvadorii Ogilvie-Grant, 1896 - Philippines (except N) and Malaysian islands off NE Borneo.

T. l. talautensis A. B. Meyer & Wigglesworth, 1895 - Talaud Is (S of Philippines).

Feral population (presumably race *salvadorii*) found around Kota Kinabalu, Sabah.

Descriptive notes. 31 cm; 148-231 g. Green, brighter on head and rump; bill red; mid-crown to nape pale blue; back suffused blue; bend of wing black, lesser wing-coverts black with broad orange-buff edging; other wing feathers blue and green; tail dusky yellow below. Immature duller, with little blue on head. Race *hybridus* has reduced blue on head and back, less black in wing; *salvadorii* has all-green back; *talautensis* has all-green back but blue of head extending onto cheeks.

Habitat. Lowland forest up to 1000 m, secondary forest and scattered trees within agricultural lands close to forest; also mangroves,

coconut groves and banana patches. Although present on large islands, this bird appears to be a small-island specialist adapted to survival in relatively confined wooded areas.

Food and Feeding. Fruits and seeds of forest trees, palm fruit, young coconuts, bananas and papaya.

Breeding. Apr-Jun. Nest in natural cavity or in deserted hole of large woodpecker, often in a clearing.

Movements. No information. Populations confined to small islands must be highly sedentary, but regular dispersal from such sites also seems likely.

Status and Conservation. ENDANGERED. CITES II. Possibly now extinct on Negros and Siquijor, and very rare on Mindoro, Luzon and other islands, owing to combination of habitat loss and high levels of illegal trade for both domestic and international markets; it is clearly uncommon on Sibuyan. However, the number of small islands on which it survives is not known and may in fact be very considerable. It was very common on larger islands in the Sulu Archipelago in 1971. It survives on Palawan albeit under great trapping pressure, and remains common in Talaud Is, although judged uncommon on Salebabu in 1985, but regular there and on Karakelong in 1995. It occurs in some national parks in Philippines, e.g. Bataan National Park, Quezon National Park and Minalungaw National Park, Luzon, and fairly common in St Paul's Subterranean National Park, Palawan.

Bibliography. Andrew (1992), Brooks *et al.* (1992), Coates & Bishop (1997), Collar *et al.* (1994), De Dios & Sweeney (1994a), Delacour & Mayr (1946), Desborough (1991), Dickinson *et al.* (1991), DuPont (1971), Dutton *et al.* (1992),

Evans, Dutton & Brooks (1993), Evans, Magsalay *et al.* (1993), Goodman *et al.* (1995), Harrison & Holyoak (1970), Jenkins (1976), Lambert (1993b), Lever (1987), Low (1989a), Luczak (1980), MacKinnon & Phillips (1993), Parkes (1971a), Rabor (1976, 1977), Rand & Rabor (1960), Riley (1997), Salomonsen (1953), Sargeant (1992), Smith (1984), Smythies (1981), Thompson, D.R. (1993), Thompson, M.C. (1966), White & Bruce (1986).

126. Blue-backed Parrot

Tanygnathus sumatranus

French: Perruche de Müller **German:** Everettpapagei **Spanish:** Loro de Müller
Other common names: Müller's/Azure-rumped Parrot

Taxonomy. *Psittacus Sumatranus* Raffles, 1822, Butung.

Proposed race *mulleri* is synonym of nominate, and indeed species formerly listed as *T. mulleri*; birds of Banggai have been awarded race *incognitus*, based on supposedly different iris colour, but data come from unreliable labels. "*T. heterurus*" (Rufous-tailed/Salvadori's Parrot) probably described from an aberrant specimen of present species. Six subspecies recognized.

Subspecies and Distribution.

T. s. duponti Parkes, 1971 - Luzon (N Philippines).

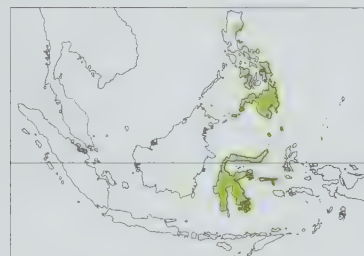
T. s. freeri McGregor, 1910 - Polillo (N Philippines).

T. s. everetti Tweeddale, 1877 - Visayan Is and Mindanao (CE & SE Philippines).

T. s. burbidgii Sharpe, 1879 - Sulu Is (SC Philippines).

T. s. sangirensis A. B. Meyer & Wigglesworth, 1894 - Sangihe and Talaud Is.

T. s. sumatranus (Raffles, 1822) - Sulawesi and adjacent islands E to Sula and Banggai Is, Muna and Butung.



Descriptive notes. 32 cm; 173-334 g. Large bill red; head bright green, becoming more yellowish on mantle and underparts, and darker on wings and tail; lower back and rump rich blue; lesser wing-coverts edged blue, other wing-coverts lightly edged yellowish; tail yellowish below. Female has bill pale horn. Immature like female. Race *sangirensis* bluer on bend of wing; *burbidgii* darker, with more yellowish head and deeper blue rump; *everetti* with yellowish green collar; *duponti* like *everetti* with paler blue rump; *freeri* larger, more yellowish, with mantle edged blue.

Habitat. Lowland and lower montane forest, lowland and deeper blue swamp forest, savanna, being commonest up to 500 m. Where sympatric with *T. lucionensis* on Sulus, more a bird of island interiors.

Food and Feeding. Often found in *Leptospermum* and *Ficus* trees, so their fruits presumably taken. Attacks and can cause serious damage to ripening corn. Often active at night, making damage prevention difficult.

Breeding. Apr on Samar (CE Philippines); otherwise known from Oct-Nov. One nest recorded in hollow of tree 30 m above ground, with two young; another was 50 m up.

Movements. No information.

Status and Conservation. Not globally threatened. CITES II. Common on Sulawesi, and in 1971 very common on the larger islands of the Sulu Archipelago. In 1978 it was found in smaller numbers than *T. lucionensis* in Talaud Is, and in mid-century was thought possibly over-trapped on Muna and Buton. In 1980's a certain amount of trade took place of birds named *T. heterurus* (name probably based on aberrant specimen of present species) which probably actually involved present species.

Bibliography. Andrew (1992), Anon. (1993), van Bemmelen & Voous (1951), Bishop (1992), Brooks *et al.* (1992), Coates & Bishop (1997), Coomans de Ruiter (1951), Delacour & Mayr (1946), Dickinson *et al.* (1991), DuPont (1971), Fraser & Henson (1996), Harrison & Holyoak (1970), Inskipp *et al.* (1996), Low (1989a), McGregor (1909-1910), Parkes (1971b, 1973), Rand & Rabor (1960), Rozendaal & Dekker (1989), Salomonsen (1952), Sargeant (1992), Stresemann (1938, 1940), Thompson (1993), Watling (1983), White & Bruce (1986).

127. Black-lored Parrot

Tanygnathus gramineus

French: Perruche de Buru **German:** Burupapagei **Spanish:** Loro de Buru
Other common names: Buru Parrot

Taxonomy. *Psittacus gramineus* J. F. Gmelin, 1788, Ambon; error = Buru.

Monotypic.

Distribution. Buru, S Moluccas.



Descriptive notes. 40 cm. Generally dull green throughout, slightly brighter on hindneck; bill red; crown and upper cheeks lightly washed bluish grey bisected by a black line through lores and shading to olive-yellow of throat and foreneck; primary coverts and primaries dull blue and edged green on outer vanes, blackish on inner; tail tipped greenish yellow, dull yellow below. Female has pinkish grey bill. Immature undescribed.

Habitat. Montane forest above 600-700 m. Birds, assumed to be this species were heard nightly arriving downslope in trees at 1100 m, just after full darkness.

Food and Feeding. No detailed information, but may be largely nocturnal.

Breeding. No information.

Movements. Apparently resident.

Status and Conservation. VULNERABLE. CITES II. A BirdLife "restricted-range" species. Very poorly known, owing to at least partially nocturnal habits, but upland forest on Buru now judged to be relatively secure compared to lowland areas, so the species might warrant downlisting from threatened status, particularly as it appears still to be fairly common within its very small range.

Bibliography. Andrew (1992), Anon. (1996b, 1996c), Coates & Bishop (1997), Collar *et al.* (1994), Jepson (1993), Low (1989a, 1994b), Poulsen & Purmiasa (1996), Rudyanto (1996), Siebers (1930), Smiet (1985), Sujatnika & Jepson (1995), Sujatnika *et al.* (1995), Thompson (1993), Wheatley (1996), White & Bruce (1986).



ssp roratus

ssp riedeli

129

128

128

ssp hypophoniuss

ssp amboinensis

ssp buruensis

130

ssp moszkowskii

ssp wetterensis

ssp coccineopterus

131

132

133

ssp chloropterus

ssp jonquillaceus

ssp erythropterus

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Genus *ECLECTUS* Wagler, 1832

128. Eclectus Parrot

Eclectus roratus

French: Grand Éclectus **German:** Edelpapagei **Spanish:** Loro Ecléctico
Other common names: Red-sided (Eclectus) Parrot, Kalanga

Taxonomy. *Psittacus roratus* P. L. S. Müller, 1776, Ambon. Genus name formerly given as *Lorius* Boddaert, 1783, although original spelling, was “*Larius*”; this name (either spelling) officially suppressed in 1970, giving way to *Eclectus* for present species, and leaving genus name *Lorius* Vigors, 1825, available for “*Domicella*” lories. Race *polychloros* formerly known as *pectoralis*, but latter name now considered a synonym of nominate. Proposed race “*westermanni*” is known only from four aviary specimens of unknown provenance dating from before 1850. Nine subspecies recognized.

Subspecies and Distribution.

E. r. vosmaeri (Rothschild, 1922) - N & C Moluccas.
E. r. roratus (P. L. S. Müller, 1776) - S Moluccas.
E. r. cornelia Bonaparte, 1850 - Sumba (Lesser Sundas).
E. r. riedeli A. B. Meyer, 1882 - Tanimbar Is.
E. r. aruensis G. R. Gray, 1858 - Aru Is.
E. r. biaki (Hartert, 1932) - Biak I.
E. r. polychloros (Scopoli, 1786) - New Guinea and adjacent islands and archipelagos.
E. r. solomonensis Rothschild & Hartert, 1901 - Admiralty Is, Bismarck Archipelago and Solomon Is.
E. r. macgillivrayi Mathews, 1913 - extreme N Queensland.
Introduced (possibly *solomonensis*) to Palau.



Descriptive notes. 35-42 cm; 355-615 g. Male green; upper mandible yellowish red, lower black; flanks and underwing-coverts red; leading edge of wing blue; primaries with deep blue; tail above with increasing blue suffusion laterally, below brownish black, tipped yellowish white both sides. Female red, darker on back and wings; bill black; lower breast to abdomen, underwing-coverts and band across mantle purplish blue; leading edge of wing blue; primaries with deep blue; tail above tipped orange-yellow, below dark red becoming orange-pink distally. Immature resembles adult of respective sex; bill greyer. Race *vosmaeri* male has yellow tinge to head, female yellow undertail-coverts; *cornelia* large, female almost entirely red; *riedeli* small, female almost entirely red, tail with yellow; *polychloros* large, male with yellow tail-tips, female breast and abdomen blue with little purple, undertail-coverts red; remaining subspecies like *polychloros* but *biaki* smaller, *aruensis* with tail more broadly tipped yellow in male, brighter blue in female, *macgillivrayi* larger; *solomonensis* smaller with smaller bill, males more yellowish.

Habitat. Occupies canopy of all wooded habitats from coast to mid-montane areas, including mangroves, nypa forest, freshwater swamp- and dryland forest, coastal scrub, denser savanna woodland, parkland, plantations, secondary growth and garden areas, but commonest in primary lowland forest. On Sumba lowland secondary forest may be preferred. Above 1000 m becomes much rarer, but encountered up to 1900 m; in Solomons transect evidence suggests it may be a lowland species.

Food and Feeding. Fruits, seeds, nuts, leaf-buds, blossoms all taken, with *Parinarium* and *Pandanus* much targeted; in Solomons fig-like fruit found in guts. Said to raid gardens for fruit, New Georgia and Obi, and witnessed doing so, Bougainville and Guadalcanal.

Breeding. Generally Aug-Sept, possibly Jan, and very likely at any time of year; Nov on Buru; Apr-Aug in Solomons. Nest in hole in high tree, generally in a clearing or at forest edge; on Sumba and in Australia deciduous trees greatly preferred, in former case with as many as 4 active nests in one tree, in latter case often near water. Up to 8 birds of both sexes may attend nests, though not always more than a pair. Eggs 2; in captivity, incubation recorded at 26 days, nestling period 12 weeks.

Movements. Local movements observed may only be daily feeding flights.

Status and Conservation. Not globally threatened. CITES II. Common, Halmahera. Moderately common but declining with elevation, Seram. Although still fairly common on Bacan, now rare on Obi, having been so common 40 years ago that it was a major crop pest; the decline is due to overtrapping, which suggests the species is unable to recover from heavy exploitation. Uncommon, Buru. Population on Sumba perhaps only 1900 birds and in great danger from habitat loss and moderate trapping pressure, which targets red females. Uncommon on Kai Is. Generally common and in places abundant on New Guinea mainland (although in one study only 10 birds/km² estimated), W Papuan Is, Bismarck Archipelago, Bougainville, New Georgia and other Solomon Is; uncommon on Guadalcanal, perhaps as a result of lack of sufficiently large trees for nesting. Increasing habit of raiding gardens for cultivated fruit in Solomons apparently correlated with recent large-scale clearance of lowland forest in many areas. In N Australia a steep decline appears to have occurred in past 30 years, attributable to illegal trapping and perhaps to inappropriate fire regimes. Males commonly seen more than females and often judged greatly to outnumber them, but on Bismarck the opposite is true; however, there is possibly some seasonal or other bias in such observations, and it may simply be that males have different foraging strategies involving daily displacements, while females remain tied to primary forest and fly much less (in captivity females spend much time in nest cavity even when not breeding).

Bibliography. Beehler *et al.* (1986), Bell (1982), Blaber (1990), Blakers *et al.* (1984), Böhm (1997), Bowler & Taylor (1989), Buckingham *et al.* (1995), Burnett (1995), Cain & Galbraith (1956), Coates (1985), Coates & Bishop (1997), Cooke (1989), Courtney (1997a), Curtis (1993), Desborough (1991, 1993a, 1993b, 1995), Diamond (1972a), Finch & McKean (1987), Forshaw (1981b), Garnett (1993), Gilliard & LeCroy (1966, 1967a), Gregory (1995a, 1995b), Hadden (1981), Higdon (1994), Hoogerwerf (1971), Indge (1953), Jepson (1993), Jones, Juhaeni *et al.* (1994), Jones, Linsley & Marsden (1995), Lambert (1993a, 1994b), Lever (1987), Linsley (1995), Marsden (1995), Mayr (1944b), Mayr & Rand (1937), Pfeffer (1988a), Rand & Gilliard (1967), Ripley (1964), Schodde (1977), Silva (1993b), Smiet (1985), Taylor, G. (1993), White & Bruce (1986).

Genus *ALISTERUS* Mathews, 1911

129. Australian King-parrot

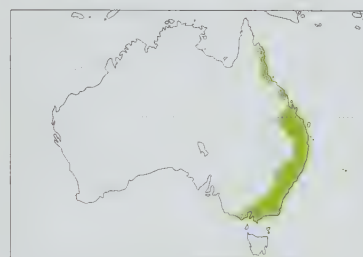
Alisterus scapularis

French: Perruche royale **German:** Königssittich **Spanish:** Papagayo Australiano
Other common names: King Parrot

Taxonomy. *Psittacus scapularis* Lichtenstein, 1818, New South Wales. Genus has occasionally been lumped with *Aprosmictus*. Two subspecies recognized.

Subspecies and Distribution.

A. s. minor Mathews, 1911 - NE Queensland.
A. s. scapularis (Lichtenstein, 1818) - NC Queensland S to S Victoria.



Descriptive notes. 42-43 cm; 209-275 g. Very similar to *A. amboinensis* but larger, with mantle and upper back oil green, inner series of upperwing-coverts pale green, underwing-coverts oil green tinged blue; undertail-coverts broadly scalloped green; tail greenish black above, greyish black below. Female like female *A. chloropterus* but with undertail-coverts scalloped green, occasional hint of pale scapulars, bill dark brownish. Immature like female but bill paler. Race *minor* smaller.

Habitat. Rain forest, *Eucalyptus* woodland, dense riparian scrub and occasionally adjacent savanna from sea-level to 1600 m, utilizing

these more open habitats outside breeding season, when also visits urban parklands and farm areas.

Food and Feeding. Seeds of eucalypts, acacias and *Angophora* particularly favoured, also of *Baloghia lucida*, plus fruits and berries of *Geijera parviflora*, *Solanum nigrum*, *S. auriculatum* and *Phytolacca octandra*, mistletoes, grass seeds, nectar, blossoms and buds. Birds raid orchards, maize and sorghum crops, sometimes taking spilt grain from farmyards, and come into gardens to feed on cultivated *Pyraacantha*, *Cotoneaster* and *Crataegus* berries plus *Quercus* acorns.

Breeding. Sept-Jan. Nest in hollow limb or in deep hole in tall forest tree. Eggs 3-6, usually 5; incubation, by female only, lasts c. 20 days; nestling period c. 5 weeks.

Movements. Notably in S of range flocks descend from mountains in late autumn and remain in lowlands until Sept. Year-round lowland birds appear to be resident once adult, but immatures show undefined movements, forming flocks of up to 30 in autumn. Birds of all ages may congregate at concentrated food resources such as fruiting trees and ripening maize.

Status and Conservation. Not globally threatened. CITES II. Generally common but lost from cleared and afforested areas.

Bibliography. Blakers *et al.* (1984), Chisholm (1934), Cooper & Frith (1994), Courtney (1997a), Emison *et al.* (1987), Favalaro (1931), Forshaw (1981b), Lepschi & Courtney (1992), Ley (1993), Lindsey, T.R. (1992), Macdonald (1988), Pizzey & Doyle (1980), Rattray (1993), Rose (1997b), Schodde & Tidemann (1986), Simpson & Day (1996), Tronson & Tronson (1987), Vriends (1979), Wood, K.A. (1992), Woodall (1993).

130. Moluccan King-parrot

Alisterus amboinensis

French: Perruche tricolore **German:** Amboinasittich **Spanish:** Papagayo Moluqueño
Other common names: Ambon/Amboina King-parrot/Parrot

Taxonomy. *Psittacus amboinensis* Linnaeus, 1766, Ambon.

Genus has occasionally been lumped with *Aprosmictus*. Forms a superspecies with *A. chloropterus*. Six subspecies recognized.

Subspecies and Distribution.

A. a. hypophonijs (S. Müller, 1843) - Halmahera in N Moluccas.
A. a. sulaensis (Reichenow, 1881) - Sula Is.
A. a. versicolor Neumann, 1939 - Peleng in Banggai Is.
A. a. buruensis (Salvadori, 1876) - Buru in S Moluccas.
A. a. amboinensis (Linnaeus, 1766) - Ambon and Seram in S Moluccas.
A. a. dorsalis (Quoy & Gaimard, 1830) - W Papuan Is and W Irian Jaya (W New Guinea).



Descriptive notes. 35 cm; 145-163 g. Head to nape and entire underparts red; upper mandible red, lower greyish; wings oil green; underwing-coverts, shoulder, lesser wing-coverts, mantle, back, rump and uppertail-coverts deep blue; tail blackish blue above, greyish below with undertail-coverts black edged red and three outer tail feathers dull pink on inner webs. Legs grey. Immature has green mantle, bill brownish black. Race *sulaensis* has variable green band across mantle, no pink edging on tail; *versicolor* like *amboinensis* but smaller; *buruensis* like *sulaensis* but pink retained, no red in bill; *hypophonijs* has wings deep blue,

no pink on tail; *dorsalis* like *amboinensis* but no pink on tail.

Habitat. Canopy and lower stages of dense primary and secondary forest from lowlands at 200-350 m to around 1400 m; on Buru, found mainly at 1100-1500 m, but this is where the only primary forest remains, so may not be a genuine habitat preference. Occasionally at the edge of gardens and plantations; found in forest on poor soils on Halmahera, where apparently intolerant of habitat disturbance. Quiet behaviour in mid-canopy recalls Neotropical trogons (*Trogon*).

Food and Feeding. Buds, seeds, grain, fruits, berries; recorded taking *Lithocarpus* acorns.

Breeding. Feb-Mar. Nest in hole in large tree. Eggs apparently 2; in captivity, incubation 19 days, nestling period 9 weeks.

Movements. No information.

Status and Conservation. Not globally threatened. CITES II. Currently considered near-threatened. Overall a common species, but despite coloration unobtrusive and difficult to detect. Rare and threatened on Halmahera; confined to primary forest areas on Taliabu (Sula Is), where perhaps 5000 birds survive. Surveys on Seram and Buru in 1991 suggested densities of 8 birds/km² in primary forest and 52 birds/km² in logged forest; the population of race *amboinensis* alone may then have been 70,000 birds. Trade pressure not great owing to exceptionally high post-capture mortality rates, but quotas set for different subspecies do not appear to reflect their known status, rather the desires of the trading community, so baseline survey and monitoring needed throughout range.

Bibliography. Andrew (1992), Anon. (1993), Beehler *et al.* (1986), Bowler & Taylor (1989), Burgess (1976), Coates & Bishop (1997), Davidson *et al.* (1995), Dingle (1981), Eck (1977), Gyldestolpe (1955b), Harrison & Holyoak (1970), Hoogerwerf (1971), Jepson (1993), Marsden (1995), Rand & Gilliard (1967), Siebers (1930), Smiet (1985), Stresemann (1914), White & Bruce (1986).

131. Papuan King-parrot

Alisterus chlorocephalus

French: Perruche à ailes vertes

German: Papuasittich

Spanish: Papagayo Papú

Other common names: Green-winged King-parrot

Taxonomy. *Aprosmictus chlorocephalus* E. P. Ramsay, 1879, Goldie River, New Guinea.

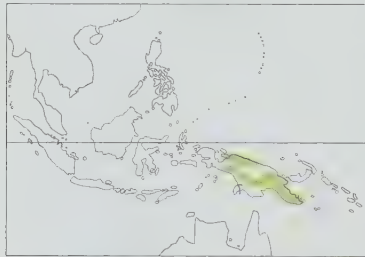
Genus has occasionally been lumped with *Aprosmictus*. Forms a superspecies with *A. amboinensis*. Three subspecies recognized.

Subspecies and Distribution.

A. c. moszkowskii (Reichenow, 1911) - N New Guinea.

A. c. callopterus (D'Alberty & Salvadori, 1879) - C New Guinea from Weyland Mts to R Fly.

A. c. chlorocephalus (E. P. Ramsay, 1879) - E New Guinea.



Descriptive notes. 36 cm; 138-190 g. Similar to *A. amboinensis* but hindcrown and nape deep blue, mantle and scapulars black, lesser and median wing-coverts greenish yellow forming large wing patch. Female has head, back, wings and underwing-coverts olive green, breast the same with reddish edges; tail green above, blackish distally. Immature like female but without reddish edges on breast, bill brownish. Race *callopterus* restricts blue above mantle to narrow nuchal band; *moszkowskii* male and female like male *callopterus*, female with mantle and back olive green.

Habitat. Shaded interior of hill rain forest, middle storey to lower canopy; less commonly in monsoon forest and second growth up to c. 2300 m, and occasionally higher or down at sea-level.

Food and Feeding. Berries, small seeds of composites, *Casuarina* fruit.

Breeding. No clear information; gonadal development in Jun and Jul, and a juvenile taken in Sept.

Movements. Apparently sedentary.

Status and Conservation. Not globally threatened. CITES II. Generally scarce and in low numbers, though locally common and probably underrecorded owing to highly unobtrusive behaviour; thus in one intensively studied lower-lying area density was estimated at 30 birds/km². A total of 3382 birds were reported in international trade in period 1987-1992, virtually all originating in Indonesia where no population data exist; however, quotas greatly reduced in mid-1990's.

Bibliography. Andrew (1992), Beehler (1978b), Beehler *et al.* (1986), Bell (1982), Campbell (1981), Clapp (1987a), Coates (1985), Cooke (1992), Diamond (1972a), Gilliard & LeCroy (1961), Gregory (1995a, 1995b), Hodges (1989), Mayr & Rand (1937), Rand & Gilliard (1967), Ripley (1964), Rothschild (1931), Schmid (1993), Sweeney (1995a).

Genus APROSMICTUS Gould, 1843

132. Olive-shouldered Parrot

Aprosmictus jonquillaceus

French: Perruche jonquille

German: Timorsittich

Spanish: Papagayo de Timor

Other common names: Timor (Red-winged) Parrot

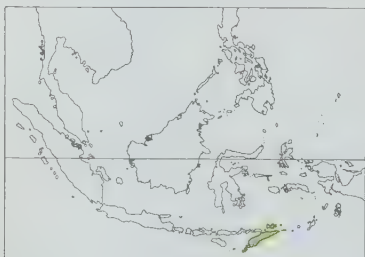
Taxonomy. *Psittacus jonquillaceus* Vieillot, 1818, New Holland; error = Timor.

Forms a superspecies with *A. erythropterus*. Two subspecies recognized.

Subspecies and Distribution.

A. j. wetterensis (Salvadori, 1891) - Wetar.

A. j. jonquillaceus (Vieillot, 1818) - Timor and Roti.



Descriptive notes. 35 cm. Similar to female *A. erythropterus* but brighter, more yellowish green on head and body, darker mantle and upper back with blue margins, bend of wing blue, inner median and lesser wing-coverts yellow. Female lacks blue on mantle and back, and blue, red and yellow on wing. Immature like female but without yellow in wing. Race *wetterensis* smaller, with little yellow and less red in the wing.

Habitat. Primary and secondary monsoon forest, savanna woodland, lightly wooded cultivation, and scrubby secondary growth, up to 2200 m.

Food and Feeding. No information available.

Breeding. No information available.

Movements. No information available.

Status and Conservation. Not globally threatened. CITES II. Currently considered near-threatened. A BirdLife "restricted-range" species. Fairly common, although habitat destruction has somewhat restricted its range. Small numbers present on Wetar, 1989. Trade levels were not excessive in 1980's, but in 1990's zero quotas, recommended while uncertainty exists over total population size, have been flouted.

Bibliography. Andrew (1992), Anon. (1993), Coates & Bishop (1997), Collar *et al.* (1994), Johnstone & Jepson (1996), Mayr (1944b), Mees (1975), Noske (1995), Robson (1990b), Verheijen (1976), Wheatley (1996), White & Bruce (1986).

133. Red-winged Parrot

Aprosmictus erythropterus

French: Perruche érythroptère

German: Rotflügelsittich

Spanish: Papagayo Alirrojo

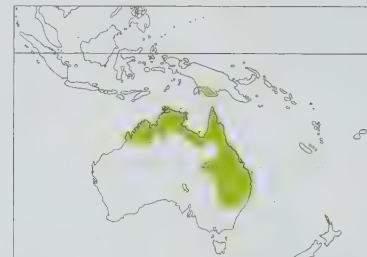
Taxonomy. *Psittacus erythropterus* J. F. Gmelin, 1788, Cooktown, northern Queensland.

Forms a superspecies with *A. jonquillaceus*. Two subspecies recognized.

Subspecies and Distribution.

A. e. coccineopterus (Gould, 1865) - S New Guinea and N Australia.

A. e. erythropterus (J. F. Gmelin, 1788) - interior E Australia.



Descriptive notes. 30-32 cm; 156 g. Green on head, nape, underparts and rump; bill orange red; mantle, upper back and secondaries greenish black; lesser, median and secondary coverts red; primaries and tail dark green, latter tipped yellow; lower back deep blue. Female duller, with reduced red in wing and no greenish black. Immature like female. Race *coccineopterus* smaller, with blue wash on hindcrown.

Habitat. In Australia open *Eucalyptus* forest, riverine thickets, *Melaleuca* woodland, arid *Acacia* scrubland, *Casuarina* and *Callitris* groves in rocky country, and mangroves; in

New Guinea subcoastal wooded savanna. Rarely far from water.

Food and Feeding. Preference shown for seeds of eucalypts, acacias and hopbush (*Dodonea*), plus mistletoe *Loranthus* berries and *Grevillea* blossoms; fruits of *Geijera parviflora*, seeds of *Cochlospermum fraseri*, *Amyema preissii*, *Gahnia*, *Crotalaria* and *Schinus areira* also noted, as well as other seeds, nuts, fruits, blossoms, nectar and insects such as lerps *Spondylaspis eucalypti* and curculionid larvae. Visits croplands to feed on ripening grain.

Breeding. Aug-Feb generally, but Apr-Jul in NE Australia. Nest high in hollow limb or deep hole in tree, often a waterside eucalypt. Eggs 3-5, sometimes 6; incubation, by female only, lasts c. 3 weeks; nestling period c. 5 weeks.

Movements. Relatively sedentary in climatically more stable regions, but rather nomadic elsewhere with irregular movements along fringes of range in Australia. Reports of large flocks in New Guinea suggest seasonal movements there.

Status and Conservation. Not globally threatened. CITES II. Generally common, locally abundant, and possibly benefiting from forest clearance in parts of Australia, where sometimes illegally persecuted due to crop depredations. International trade up to 1987 consisted of several hundred birds annually, but after 1987 numbers doubled, with 1144 exported in 1990, all birds coming from Indonesia; at around this time evidence of systematic trapping was encountered, and quotas, although not exceeded, appeared to have no biological basis.

Bibliography. Anon. (1993), Beehler *et al.* (1986), Bellchambers *et al.* (1994), Blakers *et al.* (1984), Coates (1985), Courtney (1997a), Edwards & Nash (1992), Hall (1974), Hoogerwerf (1964a), Ley (1993), Lindsey, T.R. (1992), Macdonald (1988), Mayr & Rand (1937), Mees (1982a), Pfeffer (1985), Pizzey & Doyle (1980), Rand (1942a), Rand & Gilliard (1967), Schodde & Tidemann (1986), Simpson & Day (1996), Thomson (1935), Trounson & Trounson (1987), Vriends (1979), White (1922).

Genus POLYTELIS Wagler, 1832

134. Superb Parrot

Polytelis swainsonii

French: Perruche de Barraband

German: Schildsittich

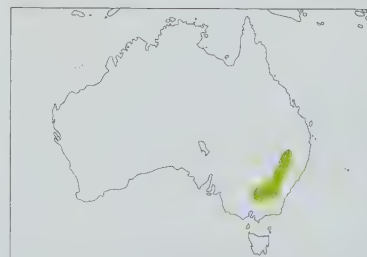
Spanish: Perico Soberbio

Other common names: Barraband/Green Leek Parrot

Taxonomy. *Psittacus Swainsonii* Desmarest, 1826, New South Wales.

Forms a parapatric species pair with *P. anthopeplus*. Monotypic.

Distribution. Interior SE Australia chiefly along the river systems of Murrumbidgee and Castlereagh.



Descriptive notes. 40 cm; 133-157 g. Green, with pinkish red bill, yellow forehead to mid-crown tinged blue on hindcrown; yellow lower face, chin and throat with a broad red band across forehead; outer webs of primaries dull blue, underside of tail black. Female all green, bluish on face, with reddish thighs and undersides of lateral tail feathers. Immature similar.

Habitat. Riverine eucalypt woodland dominated by red gum (*Eucalyptus camaldulensis*), also penetrating well-watered open forest and groves in pastures in E of range. Nest-site distribution correlated with breeding-season foraging habitat, i.e. woodland of yellow box (*Eucalyptus melliodora*), white cypress pine (*Callitris columellaris*) and borree (*Acacia pendula*).

Food and Feeding. Seeds of grasses, herbs and bushes, e.g. *Erodium*, *Stipa*, *Danthonia*, *Hordeum murinum*, *Medicago denticulata*, *Acacia armata*, heads of *Sonchus oleraceus*, *Sisymbrium* and *Capsella*; in winter lerps, mistletoe berries, *Eucalyptus* blossoms and grass seed. Sometimes takes wheat from stubble, and spilt grain at roadsides.

Breeding. Sept-Dec. Nest is situated in hollow limb or hole in tree, generally high (11-51 m) over water in a riverine eucalypt; often colonial. Eggs 4-6; incubation lasts c. 20 days; nestling period c. 30 days.

Movements. N parts of range only occupied by part of population in winter, Apr-Aug; yet also evidence of local southward movement of birds in CW New South Wales, Jun. Birds also partly nomadic, moving in search of flowering eucalypts.

Status and Conservation. VULNERABLE. CITES II. A BirdLife "restricted-range" species. Numbers apparently tumbled in 1920's as an accidental effect of a crop-protection poisoning scheme aimed at *Eolophus roseicapillus* and rabbits, although trapping for the cagebird market was also perhaps significant. Total breeding population, apparently confined to S of range, under 5000 pairs and threatened by decline in availability of nest-sites, degradation and loss of foraging habitat, and probably heavy trapping (birds breed well and captive population in Australia c. 20,000). The species has been recorded from 11 conservation reserves.

Bibliography. Blakers *et al.* (1984), Collar *et al.* (1994), Courtney (1997a), Emison *et al.* (1987), Forshaw (1981b), Frith & Calaby (1953), Garnett (1993), Kaveney (1979), Lindsey, T.R. (1992), Macdonald (1988), Pizzey & Doyle (1980), Schodde & Tidemann (1986), Schrader (1980), Simpson & Day (1996), Tronson & Tronson (1987), Vriends (1979), Webster (1988, 1992).

135. Regent Parrot

Polytelis anthopeplus

French: Perruche mélanure **German:** Bergsittich **Spanish:** Perico Regente
Other common names: Rock Peppler

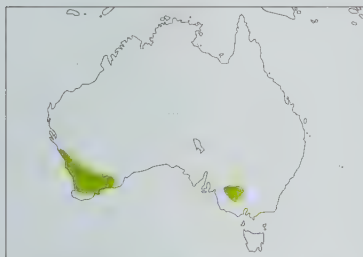
Taxonomy. *Palaeornis anthopeplus* Lear, 1831, no locality = New South Wales; error, now replaced by Boigart, c. 40 km north of Toodyay, south-west Australia.

Forms a parapatric species pair with *P. swainsonii*. Eastern race erroneously listed as nominate in past, with western birds placed in race *westralis*. Two subspecies recognized.

Subspecies and Distribution.

P. a. anthopeplus (Lear, 1831) - SW Australia.

P. a. monarchoides Schodde, 1993 - interior W part of SE Australia.



Descriptive notes. 40 cm; mean 114 g. Bill pinkish red; head pale yellowish olive, shading to dark olive on mantle, back and scapulars; underparts, rump and lesser and median wing-coverts bright yellow; remainder of wing blackish except for broad red band on inner secondaries; tail blue-black. Female duller and much greener. Immature similar. Race *monarchoides* has less olive head and breast.

Habitat. In SE Australia, flooded-zone *Eucalyptus* woodland and adjacent arid mallee scrublands, with breeding always taking place within 20 km of mallee or cultivated land; in

SW, most types of wooded land including partly cleared areas in dense coastal forest.

Food and Feeding. In SE of range formerly fed extensively on seeds of native hops *Dodonaea attenuata* and *D. viscosa*, now much reduced by human settlement; still feeds primarily in mallee, on seeds of *Eucalyptus*, *Acacia*, grasses (five wild Poaceae recorded) and herbaceous plants (five Asteraceae, four Chenopodiaceae, two Cucurbitaceae, two Dilleniaceae), plus fruits (e.g. *Ficus* and *Amyema* mistletoe), leaf buds, blossoms and green shoots; also wheat and cultivated fruits, thus sometimes a crop pest in fields, vineyards and orchards.

Breeding. Aug-Jan, also May. Usually in small loose colonies of up to 67 pairs; of 57 nests in one study, 45 were within 150 m of another nest. Nest in often deep hollow in main trunk of tree, commonly salmon gum (*Eucalyptus salmonophloia*) and wandoo (*E. wandoo*) in SW Australia, *E. camaldulensis* in SE; hole always above 4 m, and sites always within 5 km of blocks of mallee. Eggs 4-6; incubation lasts 21 days; nestling period c. 6 weeks.

Movements. Northward post-breeding dispersal in SE Australia, while in SW there is evidence of seasonal (commoner May-Dec than Jan-Mar), irruptive and nomadic behaviour, apparently depending on regularity of rains, with certain well-watered core areas being occupied year-round.

Status and Conservation. Not globally threatened. CITES II. Now very uncommon in SE Australia, retreating before clearance of mallee for agriculture, but abundance in fact initially increased in SW as a result of human occupation of the wheatbelt, with flocks of up to 100 reported. However, substantial decline since 1940's throughout the wheatbelt, probably as a result of loss of nest-sites, possibly compounded by an open season in five shires of Western Australia to control numbers invading croplands; recent signs of increasing numbers. Poor regeneration of nest-trees is certainly a long-term cause for concern; the species needs large, old gums near water, and additionally these must be acceptably close to feeding habitat. Competition for nest-sites with feral honey bees appears not to be significant, but there is some overlap in site preference. In SE Australia, roadkills while taking spilt grain common, and occupation of nests by feral bees problematic.

Bibliography. Beardsell (1985), Blakers *et al.* (1984), Burbidge (1985), Courtney (1997a), Emison *et al.* (1987), Forde (1990), Forshaw (1981b), Garnett (1993), Harper (1989), Joseph (1978), Lindsey, T.R. (1992), Long & Mawson (1994), Macdonald (1988), Masters & Milhinch (1974), Mawson & Long (1994), Oldroyd *et al.* (1994), Pizzey & Doyle (1980), Saunders & Ingram (1995), Schodde (1993), Schodde & Tidemann (1986), Sedgwick (1949), Serventy & Whittell (1976), Shields (1983), Simpson & Day (1996), Sontter (1984), Tronson & Tronson (1987), Vriends (1979).

136. Princess Parrot

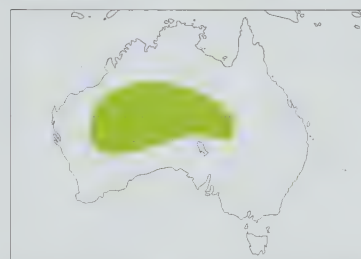
Polytelis alexandrae

French: Perruche d'Alexandra **German:** Alexandrasittich **Spanish:** Perico Princesa
Other common names: Alexandra's Parrot, Princess of Wales Parakeet

Taxonomy. *Polytelis alexandrae* Gould, 1863, Howell's Ponds, Central Australia.

Monotypic.

Distribution. Interior W & C Australia.



Descriptive notes. 45 cm. Bill pinkish red, yellow at tip; crown to nape soft pale blue, merging on neck into light olive brown of mantle, back and scapulars; area from upper mandible to behind eye buffy green; chin, lower cheeks, throat and upper breast pink; lower breast to belly olive yellow tinged greyish blue between thighs, with some pink on thighs; wing-coverts grass green except primary coverts purple; flight-feathers olive green with yellow outer edges to primaries; lower back and rump mauve; tail light grey-green with yellow, red, grey and black in outer feathers. Female has greyish crown and rump, smaller

area of pink on breast, somewhat duller. Immature similar.

Habitat. Sandy deserts with hummock grassland of *Triodia* and *Plectrachne*, usually with a shrub layer, stands of *Casuarina* in sandy country, *Acacia* scrublands and eucalypts, notably *Eucalyptus camaldulensis*, bordering watercourses, this last commonly used for nesting.

Food and Feeding. Seeds of grasses and herbaceous plants, notably spinifex, but also *Danthonia bipartita*, *Portulaca oleracea*, *Stenopetalum anfractum*, *Rhynchelytrum repens* and *Calandrinia*; seeds and perhaps blossoms of *Acacia* and *Casuarina*, taking green leaflets of latter, and seen feeding on leaves of *Codonocarpus cotinifolius*, flowers of *Crotalaria cunninghami*, *Grevillea wickhamii* and *Hakea suberea*.

Breeding. Recorded Sept-Dec, but dependent young also seen in Jul; probably at any time of year after rainfall. Nest in hollow limb or hole in tree, usually a riverine eucalypt but sometimes *Casuarina*; sometimes colonial, with up to 10 nests in one tree. Eggs 4-6; incubation lasts c. 21 days.

Movements. Irruptive and/or nomadic; recent analysis suggests a core population around Lake Tobin, in the east of the Great Sandy Desert, from which birds range out far more widely over several years when conditions permit.

Status and Conservation. VULNERABLE. CITES II. Population very difficult to assess in a very scarce, apparently nomadic species with a large range; possibly no major decline but decline and extinction of other sympatric non-avian taxa, and absence of records of large numbers since 1963, caused concern; in Jul 1993 almost 300 were counted in one part of the Lake Tobin area. Possible that man-made changes to its habitat may have favoured more water-dependent competitors. No fewer than 25,000 held in captivity in Australia.

Bibliography. Allen (1987), Blakers *et al.* (1984), Brouwer & Garnett (1990), Carter (1993), Collar & Andrew (1988), Collar *et al.* (1994), Courtney (1997a), Emmett (1987), Fitzherbert & Baker-Gabb (1988), Forshaw (1981a, 1981b), Garnett (1993), Hobcroft (1993), Lindsey, T.R. (1992), Macdonald (1988), Pizzey & Doyle (1980), Rakos (1993a), Schodde & Tidemann (1986), Serventy & Whittell (1976), Simpson & Day (1996), Slater (1978), Tronson & Tronson (1987), Vriends (1979).

ssp eupatria

138

ssp borealis

139

ssp krameri

ssp siamensis

PLATE 41

inches 6
cm 15

137

142

143

141

140

145

146

144

149

ssp nicobarica

ssp modesta

147

148

150

ssp fasciata

ssp tyleri

ssp longicauda



Genus *PSITTACULA* Cuvier, 1800

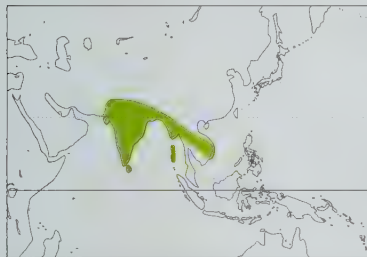
137. Alexandrine Parakeet

Psittacula eupatria

French: Perruche alexandre **German:** Großer Alexandersittich **Spanish:** Cotorra Alejandrina

Taxonomy. *Psittacus Eupatria* Linnaeus, 1766, Gingi, India. Some of currently accepted races may be representative of clines, with race *nipalensis* particularly weak. Five subspecies currently recognized.

Subspecies and Distribution.
P. e. nipalensis (Hodgson, 1836) - E Afghanistan and Pakistan E through N India to Bangladesh.
P. e. eupatria (Linnaeus, 1766) - S India and Sri Lanka.
P. e. magnirostris (Ball, 1872) - Andaman Is.
P. e. avensis (Kloss, 1917) - Assam (NE India) and N Myanmar.
P. e. siamensis (Kloss, 1917) - W & N Thailand E to C Indochina.



Descriptive notes. 50-62 cm; 198-258 g. Bill red; head green shading to grey on nape and lower face; black chin and malar bar to side of neck where replaced by broad pink-red bar round hindneck; upper body yellow-green shading deeper on wings and belly; long reddish patch on lesser wing-coverts; tail green basally shading through pale blue-green to yellowish tip, with outer feathers green with yellowish tips. Female duller, with no black on chin or pink collar. Immature like female. Race *nipalensis* larger, purportedly with more blue than grey in head; *magnirostris* has larger bill, narrow blue band above pink collar.

brighter wing-patch; *avensis* has yellowish neck; *siamensis* has yellowish green face and neck, with blue wash on nape; last three all have narrower black markings on chin and neck.

Habitat. Dry and moist deciduous lowland forest and wooded areas including mangroves, coconut plantations and old gardens, penetrating desert regions where trees grow by water, normally rising to 800 m, in places at least occasionally to 1600 m, occupying subtropical pine zone of *Pinus roxburghii* in Pakistan; at least formerly occupied mangroves in the Sunderbans, Bangladesh.

Food and Feeding. Fruits, e.g. guavas (*Psidium guajava*), and seeds, nectar of *Salmalia*, *Butea* and *Erythrina*, fleshy petals of *Bussia latifolia*, and young leaves of vegetables. Flocks do considerable damage in orchards and ripening cereal crops. Over 70% of food in stomachs of birds from agricultural area, W Pakistan, was from cultivated sources.

Breeding. Nov-Apr. Nest in hole in coconut palm or large softwood like *Salmalia*, sometimes the hardwood *Shorea* and *Dalbergia*, and mangroves *Sonneratia* and *Heritiera*; *Terminalia* recorded in Sri Lanka. Normally 3-4 eggs, but 2-3 in Andamans; incubation 19-21 days.

Movements. Resident, but also nomadic and locally migratory in N India.

Status and Conservation. Not globally threatened. CITES II. Nominate race common in Pakistan, relatively sparse in India, and has declined steeply in Sri Lanka, where now rare and mainly confined to the N. However, forms in N Indian subcontinent and on Andamans common, and much used locally as pets. Apparently only in modest numbers in Myanmar. In Thailand nest robbery is exterminating the population. Seemingly scarce, probably for similar reasons, in Indochina, and in 1995 absent from at least one area where formerly common.

Bibliography. Abdulali (1964, 1981), Ali (1996), Ali & Ripley (1981), Beaman (1994), Deignan (1945), Delacour & Jabouille (1931), Eates (1937), Harvey (1990), Heydon (1929), Hoppe (1987), Inskipp & Inskipp (1991), Jennings (1992), Kotagama (1985), Lekagul & Round (1991), Luft (1994), Majumdar *et al.* (1992), Phillips (1978), Puget (1970), Ripley (1982), Roberts, T.J. (1991), Round (1988), Sindel (1974), Smythies (1986), Tehsin & Tehsin (1990), Thewlis *et al.* (1996), Vriends (1979), Zingel (1997).

138. Rose-ringed Parakeet

Psittacula krameri

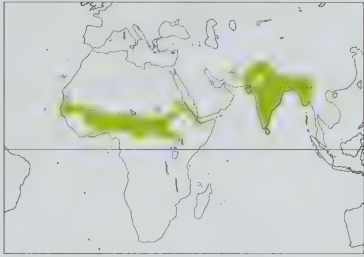
French: Perruche à collier **German:** Halsbandsittich **Spanish:** Cotorra de Kramer
Other common names: Ring-necked Parakeet

Taxonomy. *Psittacus krameri* Scopoli, 1769, Senegal. Four subspecies recognized.

Subspecies and Distribution.
P. k. krameri (Scopoli, 1769) - S Mauritania, Senegal and Guinea E to W Uganda and S Sudan.
P. k. parvirostris (Sourance, 1856) - CE Sudan through Ethiopia, Eritrea and Djibouti to NW Somalia.
P. k. borealis (Neumann, 1915) - NW Pakistan E through N India, Nepal and C Myanmar to SE China (Guangdong); reportedly once in Indochina.
P. k. manillensis (Bechstein, 1800) - Peninsular India S of 20° N, and Sri Lanka.

Feral in many cities and their environs in Africa, Arabia, W Palearctic and W Asia (some populations of these might conceivably be natural); also Mauritius, Hong Kong, Macao and Singapore, and apparently USA; unclear which races involved, although often attributed to *borealis*.

Descriptive notes. 37-43 cm; 95-143 g. Pale yellowish green, with upper mandible dark red tipped black, lower black, with black chin and malar area curving and narrowing into half-collar on side of neck, where bordered below by a narrow rose pink line that extends over nape, above by indistinct mauve-blue extending onto hindcrown; flight-feathers dusky green above, grey below; tail bluish green on central feathers, ochrish below. Female lacks blue, pink and black on head but can show emerald collar. Immature like female but yellower, with no or indistinct collar. Race *parvirostris* darker, with stronger pink collar in male, upper mandible all red; *borealis* larger and more greyish below, with more blue on head, bill usually all red; *manillensis* like *borealis* with black lower mandible.



Habitat. Chiefly deciduous habitats ranging from semi-desert to light secondary jungle, mainly in lowlands but ranging in Asia up to 1600 m and in Ethiopia to c. 2000 m. Short-grass and semi-desert savanna, open scrub and bushland, wooded valleys, savanna woodland, riparian and evergreen forest, foothill pine zone in *Pinus roxburghii*, open agricultural land with scattered trees, gardens, orchards, cultivations, often also grain yards at entrepôts and railway stations.

Food and Feeding. In Africa, recorded fruits include *Ficus*, *Ziziphus*, *Tamarindus*, guavas, dates, mangoes, baobab, seeds of *Acacia albidia* and *Slassus*, plus cultivated seeds and nuts of millet, sorghum, lentils, guinea-corn, groundnuts, oil-palms, coffee. In Asia, specific items identified include seeds of *Prosopis speiagera*, *Acacia arabica*, *Casuarina equisetifolia*, fruit of *Dalbergia sissoo*, *Ficus*, *Acacia*, *Ziziphus*, *Xanthium*, *Melia azedarach*, *Azadirachta indica* and *Albizia lebbek*, flowers and fruit of *Capparis aphylla*, flower petals and nectar of *Salmalia malabarica*, *Erythrina indica*, *Butea monosperma*, *Bassia latifolia*. In Asia, especially India, regarded as one of the most destructive bird pests in agriculture, coming in enormous flocks to cereals and fruit crops, especially *Citrus* and *Prunus*; however, in one area, guavas (*Psidium guajava*) were the favoured cultivated fruit, with maize eaten Sept-Dec, ground-nuts Nov-Mar and May-Jun, and wheat Mar; in another, pearl millet, sorghum and maize were greatly consumed Aug-Dec, guava Jan-Mar and Jul-Aug, mulberry (*Morus alba*) seeds Apr-May. Coffee, chillie, sunflowers, mustard, pepper and gram also attacked; will tear open sacks. Feral birds in UK take fruits and berries of Rosaceae, *Ilex*, *Sambucus*, nuts of *Fagus*, *Aesculus*, *Carpinus*, *Fraxinus*, *Pinus*, cultivated fruit and cereals, food at bird-tables; feral birds in Arabia take dates, grain, seeds of sunflower and *Caesalpinia*.

Breeding. Dec-May in W Africa and probably also Arabian Peninsula (possibly introduced); in Nigeria, nesting attempted in May, but failed owing to aggression by Red-billed Hornbills (*Tockus erythrorhynchus*); Sept in South Africa, in willow trees over a large pool; Jan-Apr, sometimes to Jul, in Asia; Jan-Jun in UK (introduced). Nest in hollow in tree, usually enlarged by birds themselves, 3-10 m up, but sometimes in rock faces or ruined walls; often loosely colonial. Eggs usually 3-4, rarely 6; incubation lasts 22 days; nestling period 7 weeks.

Movements. Resident, but subject to minor local movements in Africa, e.g. recorded throughout year in Ouagadougou, Burkina Faso, except Jun, and a rainy season visitor (Aug-Nov) to parts of S Mauritania. Also irregular in Ghana and one part of Central African Republic.

Status and Conservation. Not globally threatened. CITES III (Ghana). Common to abundant throughout natural range and in many places where introduced, e.g. Mauritius, and generally increasing in numbers and range, partly through introductions and escapes, partly through use of spreading agriculture and horticulture. Introduced to but died out from Zanzibar, loss being attributed to House Crows (*Corvus splendens*). Noted as a crop pest at start of century. Ghana, and now recognized as such throughout its range, including areas where introduced such as South Africa. Only fairly common, Myanmar; very rare in limited range, China.

Bibliography. Ahmad (1986), Ali (1996), Ali & Ripley (1981), Balança & de Visscher (1993), Balasubramanian (1989), Beaman (1994), de Bie & Morgan (1989), de Boer & Legoupil (1993), Britton (1980a), Cave & Macdonald (1955), Cheke & Walsh (1996), Cheng Tsohsin (1987), Cooper *et al.* (1971), Cramp (1985), Crick & Marshall (1981), Cunningham-van Someren (1969), Dowsett & Forbes-Watson (1993), Elgood *et al.* (1994), Étchécopar (1969), Evans, M.I. (1994), Fry *et al.* (1988), Gallagher & Woodcock (1980), Gee (1984), Giraudoux *et al.* (1988), Goodman (1982), Goodman *et al.* (1989), Gore (1990), Green (1983), Grewal & Kapoor (1986), Grimes (1987), Hue & Étchécopar (1970), Inskipp & Inskipp (1991), Jennings (1981b), Kinzelbach (1986), Koster & Grettenberger (1983), Kotagama (1983, 1985), Lamba (1966), Lever (1987), Luft (1994), Mackworth-Præd & Grant (1957, 1970), Maclean (1993), Malhi & Brar (1987), Marchant (1961a), Morgan (1993), Mukherjee (1995), Pakenham (1979), Paz (1987), Phillips (1978), Puget (1970), Rana (1987), Rao & Shivanarayan (1981), Ripley (1982), Roberts, T.J. (1991), Saini *et al.* (1994), Sandhu & Dhindsa (1982), Sarwar *et al.* (1989), Shafi *et al.* (1986), Sharland & Wilkinson (1981), Shirihi (1996), Shivanarayan *et al.* (1981), Short *et al.* (1990), Simwat & Sidhu (1973a, 1973b), Smith, G.A. (1972, 1976), Smythies (1986), Snow (1978), Spano & Truffi (1986), Subramanya (1994), Thiollay (1985), Thonnérieux *et al.* (1989), Toor & Ramzan (1974a, 1974b), Vaurie (1965), Vriends (1979), Weissenbacher & Allan (1985), Wilkinson & Beecroft (1985), Wittenberg (1988), Zingel (1997).

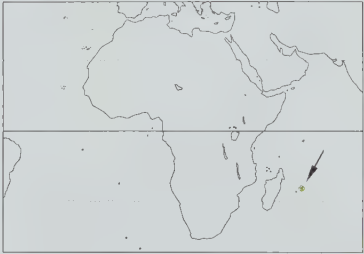
139. Mauritius Parakeet

Psittacula echo

French: Perruche de Maurice **German:** Mauritiussittich **Spanish:** Cotorra de Mauricio
Other common names: Echo Parakeet

Taxonomy. *Palæornis echo* A. and E. Newton, 1876, Mauritius. Has been treated as a race of *P. krameri*, or of extinct *P. eques* from Reunion; name *echo* even regarded as a junior synonym of *eques*, being indistinguishable from descriptions of the latter, of which no specimens survive. Monotypic.

Distribution. Mauritius.



Descriptive notes. 36-42 cm; 167-193 g. Very similar to *P. krameri* but darker, richer green, with bluish wash on nape, tail greener above, shorter. Female like female *krameri* but darker, more emerald green, and bill all black. Immature like female.

Habitat. Native lowland and upland forest and scrublands, formerly in lightly wooded, i.e. heavily degraded country; now favours areas with largest remaining native trees such as *Canarium mauritanum*, *Syzygium contractum*, *Mimusops maxima* and *Labourdonnaisia*.

Food and Feeding. Fruit of native plants such as *Calophyllum*, *Tabernaemontana*, *Labour-*

On following pages: 140. Slaty-headed Parakeet (*Psittacula himalayana*); 141. Grey-headed Parakeet (*Psittacula finschii*); 142. Intermediate Parakeet (*Psittacula intermedia*); 143. Plum-headed Parakeet (*Psittacula cyanocephala*); 144. Blossom-headed Parakeet (*Psittacula roseata*); 145. Malabar Parakeet (*Psittacula columboides*); 146. Emerald-collared Parakeet (*Psittacula calthropae*); 147. Derbyan Parakeet (*Psittacula derbiana*); 148. Red-breasted Parakeet (*Psittacula alexandri*); 149. Nicobar Parakeet (*Psittacula caniceps*); 150. Long-tailed Parakeet (*Psittacula longicauda*).

donnaisia, *Mimusops*, *Syzygium*, *Sideroxylon*, *Nuxia*, *Diospyros*, *Eugenia* and *Erythrospermum*, plus some introduced species. More leaves consumed in winter when fruit scarcer.

Breeding. Sept-Feb. Nest in rain-sheltered hole at least 10 m up in hollow limb of old, usually living tree, notably *Mimusops* but also *Calophyllum*, *Canarium* and *Sideroxylon*. Eggs 2-4, normally with 2 young being raised; incubation probably c. 22 days; nestling period around 9 weeks.

Movements. Sedentary; birds may formerly have shifted areas quite extensively with seasonal changes in foods, in particular when cyclones stripped fruit from trees.

Status and Conservation. CRITICALLY ENDANGERED. CITES I. A BirdLife "restricted-range" species. Almost total clearance of forest on Mauritius has confined the remaining population to small area of native vegetation in the mountainous SW, based on Black River Gorges, now a national park. Illegal hunting, nest predation and food competition by macaques, nest-site competition from introduced *P. krameri* and Common Mynas (*Acridotheres tristis*), and the impact of cyclones on food supplies and nest-sites were all implicated in the extinction vortex this species appeared to have entered in the 1970's and 1980's, during which time there was almost total breeding failure and the population was believed to be around 10 individuals. Some breeding success since then has resulted in numbers rising to 16-22 in 1993-1994, with a pair in captivity also producing offspring; by 1996 there were 13 breeding groups (pairs and helpers) in the wild, i.e. 40-50 birds in total, and first clutches were being taken for captive rearing and subsequent release, in order to maximize current reproductive output. Including captive birds, overall total now stands at c. 85-90 birds.

Bibliography. Ahimaz (1984, 1987), Anon. (1984, 1996d), Cheke (1987), Cheke & Jones (1987), Collar & Andrew (1988), Collar & Stuart (1985), Collar *et al.* (1994), Diamond, A.W. (1985a), Dowsett & Dowsett-Lemaire (1993), Dowsett & Forbes-Watson (1993), Greenwood (1997), Hachisuka (1953), Hartley (1993), Horne (1987), Hume (1996), Jones, C.G. (1980a, 1980b, 1981, 1982, 1987), Jones, C.G. & Duffly (1992, 1993), King (1978/79), Lovegrove (1995), Low (1994b, 1997e), Meinertzhagen (1912), Newton (1958), Procter & Salm (1974), Rountree *et al.* (1952), Sargeant (1992), Staub (1971), Steele (1979), Swinnerton (1995), Temple (1974, 1976, 1978a), Temple *et al.* (1974), Williams, S. (1995, 1997), Young (1987).

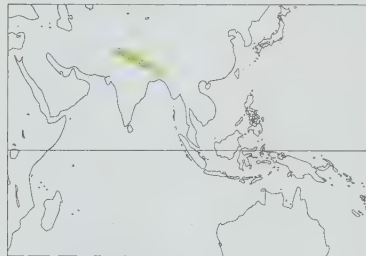
140. Slaty-headed Parakeet

Psittacula himalayana

French: Perruche de l'Himalaya **German:** Himalayasittich **Spanish:** Cotorra del Himalaya
Other common names: Himalayan (Slaty-headed) Parakeet

Taxonomy. *Psittacus* (*Conurus*) *Himalayanus* Lesson, 1832, valleys of the Himalayas. Formerly considered conspecific with *P. finschii*. Monotypic.

Distribution. Himalayas from Afghanistan and W Pakistan E through N India and Nepal to Bhutan and W Assam.



Descriptive notes. 39-41 cm. Upper mandible red tipped yellow, lower yellow; head slate grey with black half-collar from chin and throat up sides of neck; body yellowish green, tinged bluish on upperparts; wings green with maroon patch on lesser wing-coverts; tail green basally shading through blue to yellow distally. Immature green with cheeks brownish, bill greyish.

Habitat. Subtropical coniferous and deciduous woodlands, especially deodar (cedar) forest, cultivated areas with large trees, 600-2500 m, generally above 1350 m.

Food and Feeding. Camphor (*Cinnamomum*),

Cornus, *Viburnum* and *Duranta* berries, acorns of *Quercus dilatata*, seeds of *Rhus cotinus*, *Terminalia myriocarpa* and *Populus ciliata*, flowers of *Bauhinia purpurea*, *Woodfordia fruticosa*, *Bombax ceiba* and *Pistacia integerrima*, and pods of *Dalbergia*. In some places birds raid walnut, apple and pear orchards, and cornfields.

Breeding. Mar-Jul, staggered with altitude. In Afghanistan old nesting holes of Scaly-bellied Woodpecker (*Picus squamatus*) commonly used, while in Pakistan use of *Quercus dilatata* common; usually colonial. Eggs 3-5; in captivity, incubation 24 days, nestling period c. 40 days.

Movements. Nomadic in E Afghanistan, but elsewhere clear movements occur to lower-lying areas in winter, often first targeting cultivated areas, and in Pakistan the period spent on breeding grounds is Mar-Aug.

Status and Conservation. Not globally threatened. CITES II. Generally common, but apparently very poorly documented in recent decades; uncommon in China.

Bibliography. Ali (1996), Ali & Ripley (1981), Ali *et al.* (1996), Bates & Lowther (1952), Beaman (1994), Biswas (1960), Cheng Tsohsin (1987), Evans, M.J. (1994), Fleming (1967), Gauntlett (1972), Grewal (1995), Hùe & Etchécopar (1970), Inskipp, C. & Inskipp (1991), Inskipp, T. *et al.* (1996), Puget (1970), Ripley (1982), Roberts, T.J. (1991), Sedgemoor (1995), Vaurie (1965), Vieillard (1969), Wright (1957).

141. Grey-headed Parakeet

Psittacula finschii

French: Perruche de Finsch **German:** Finschsittich **Spanish:** Cotorra de Finsch
Other common names: Finsch's/Hume's/Eastern Slaty-headed Parakeet

Taxonomy. *Palaeornis Finschii* Hume, 1874, Kollidoo, 3500-5000 feet (c. 1000-1500 m), upper Salween River, Myanmar.

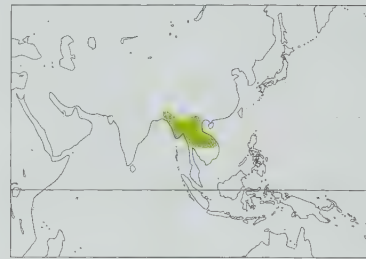
Long considered conspecific with *P. himalayana*, but the two recorded within 25 km of each other in N Bengal and SE Bhutan; however, other evidence suggests birds are convergent in this region, while the close geographical approach of two more distinct forms may simply reflect migration; separation as two species remains provisional. Monotypic.

Distribution. India from W Bengal E through Bangladesh, S China, Myanmar and Thailand to Indochina.

Descriptive notes. 36-40 cm. Very similar to *P. himalayana* but smaller with longer tail feathers, slightly paler head, yellower upperparts and darker blue-green underwing-coverts. Immature all green.

Habitat. Open mixed deciduous forest, teak forest, secondary growth, cultivation and tea plantations in foothills at 600-1200 m, though recorded down to 100 m in Assam and up to 3800 m in China; in Indochina apparently more strictly associated with forest.

Food and Feeding. Leaf buds and developing cherry (*Prunus*) fruit, letpan flowers and flowering climbers, seeds of *Dendrocalamus longispatus* and various figs, grains.



habitat clearance but this remains poorly documented. Birds occur in local markets in Vietnam, and 917 were recorded in international trade, 1987-1992, most coming from Myanmar.

Bibliography. Ali & Ripley (1981), Ali *et al.* (1996), Bangs & Van Tyne (1931), Beaman (1994), Cheng Tsohsin (1987), David-Beaulieu (1944), Deignan (1945), Delacour & Jabouille (1931), Etchécopar & Hùe (1978), Harvey (1990), Husain (1959b), Inskipp *et al.* (1996), Khan (1981), Lekagul & Round (1991), Ripley (1982), Robson *et al.* (1989), Round (1988), Smythies (1986), Stepanyan (1995), Vaurie (1965).

142. Intermediate Parakeet

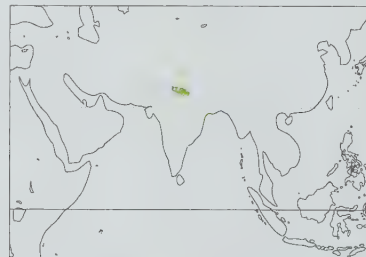
Psittacula intermedia

French: Perruche intermédiaire **German:** Mittelsittich **Spanish:** Cotorra Intermedia
Other common names: Rothschild's Parakeet, Intermediate Parrot

Taxonomy. *Palaeornis intermedia* Rothschild, 1895, India.

Status controversial owing to uncertainty over range and the increasing probability of its representing hybrid *P. himalayana* x *P. cyanocephala*, for which the evidence is becoming extremely convincing. Monotypic.

Distribution. Reportedly from the Mattiyar and Varanasi regions in the plains of Uttar Pradesh, NC India.



Descriptive notes. 36 cm. Intermediate between *P. himalayana* and *P. cyanocephala*, with upper mandible orange-red, lower mandible yellow to black, area from forehead to behind and around eye rufous-purple, rest of head slaty purple, back yellowish green, rump green tinged blue, tail with yellowish white tips to central feathers, outer webs of outer feathers bluish green with yellow tips. Immature undescribed.

Habitat. Unknown.

Food and Feeding. Unknown.

Breeding. Unknown.

Movements. Unknown.

Status and Conservation. VULNERABLE. CITES II. Clearly if this form really has the status of a species then it is a very rare one. Very small numbers of birds are reputedly captured by trappers pursuing the common *Psittacula* parakeets of N India. However, it is becoming increasingly likely that the birds in question are hybrids, although it remains to be established whether they are captive-bred or the result of natural crossing.

Bibliography. Ali & Ripley (1981), Biswas (1959, 1989), Collar & Andrew (1988), Collar *et al.* (1994), Husain (1959a), Inskipp, C. & Inskipp (1995), Inskipp, T. *et al.* (1996), Ripley (1982), Sane (1975), Sane *et al.* (1987), Walters (1985), Wheatley (1996).

143. Plum-headed Parakeet

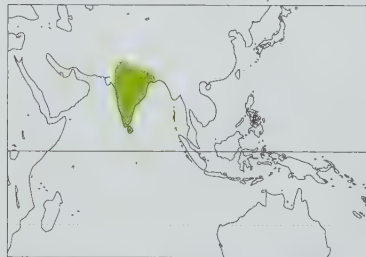
Psittacula cyanocephala

French: Perruche à tête prune **German:** Pflaumenkopfsittich **Spanish:** Cotorra Ciruela

Taxonomy. *Psittacus cyanocephalus* Linnaeus, 1766, East Indies = Gingi.

Birds decrease clinally in size from N to S, and head and rump become darker, but limits to proposed N subspecies *bengalensis* too indistinct to make the name useful. Monotypic.

Distribution. Indian Subcontinent and Sri Lanka.



Descriptive notes. 33-37 cm; 56-85 g. Bill yellowish above, black below; head crimson shading to greyish plum on mid-crown to nape and ear-coverts; black chin extending as complete narrow collar, shaded blue-green below on back and sides of neck; underparts yellowish green; mantle and back green, shading darker on wing-coverts, with maroon patch on lesser wing-coverts, and darker again on flight-feathers; rump light blue-green, tail blue tipped whitish centrally, green tipped yellow laterally. Female has purplish grey head with no black, instead an indistinct complete narrow yellowish neck-ring, no maroon wing-patch, creamy upper mandible. Immature has green head, orange on forecrown.

Habitat. Moist deciduous forest and wooded habitats and adjacent clearings and cultivated areas in lowlands and hills to c. 1300 m, using pine zone *Pinus roxburghii* in Pakistan foothills.

Food and Feeding. More frugivorous than most *Psittacula* parakeets, and prefer small to large seeds. Fruit of *Ficus* and *Ziziphus*, buds, fleshy petals and nectar of plants such as *Adhatoda vasica*, *Punica granatum*, *Salmalia*, *Butea* and *Bassia*, seeds of thistles *Echinops* and *Cnicus*; feeding in *Casuarina* also noted. Sometimes visits cultivations inside forest in flocks of several hundred, doing much damage to crops including rice, sorghum, maize, vegetables and orchard fruit.

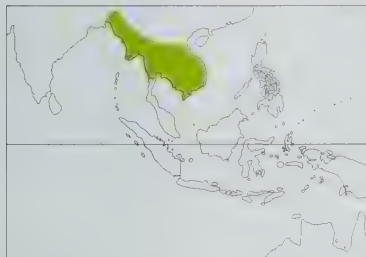
Breeding. Dec-Apr; in Sri Lanka also occasionally Jul-Aug. Nest in hole in tree trunk or bough, often in small colonies within one tree or group of trees; tall *Pinus roxburghii* are favoured in Pakistan, while a *Parkia* recorded in Sri Lanka. Eggs 4-5, rarely 6; in captivity, incubation lasts 24 days, nestling period 6 weeks.

Movements. Resident, but with marked local movements in response to food supply.
Status and Conservation. Not globally threatened. CITES II. Fairly common in Nepal, but with an apparently decline in Kathmandu Valley. In India generally common. Formerly abundant in low-lands of Sri Lanka, but habitat loss has forced range inwards, and now only common at mid-altitudes.
Bibliography. Ali (1996), Ali & Ripley (1981), Biswas (1951b), Chakravarthy & Purna Chandra Tejasvi (1992), Grewal (1995), Henry (1971), Inskipp, C. & Inskipp (1991), Inskipp, T. *et al.* (1996), Kotagama (1985), Kotagama & Fernando (1994), Legge (1880), Lever (1987), Lowther (1940), Luft (1994), Majumdar *et al.* (1992), Mukherjee (1995), Phillips (1978), Proud (1949), Rand & Fleming (1957), Ripley (1982), Roberts, T.J. (1991), Saha & Dasgupta (1992), Smith, G.A. (1976), Vriends (1979), Wijesinghe (1994).

144. Blossom-headed Parakeet
Psittacula roseata

French: Perruche à tête rose **German:** Rosenkopfsittich **Spanish:** Cotorra Carirrosa

Taxonomy. *Psittacula roseata* Biswas, 1951, Gunjong, North Cachar, Assam. Formerly considered conspecific with *P. cyanocephala*, and listed as *P. c. rosa* (Boddaert, 1783). Two subspecies recognized.
Subspecies and Distribution.
P. r. roseata Biswas, 1951 - W Bengal, Bhutan, N Assam, Bangladesh and N Myanmar.
P. r. juneae Biswas, 1951 - S Assam and S Myanmar E through Thailand to Indochina; also possibly S China, with a 19th century record based on juveniles that might have been *P. finschi*.

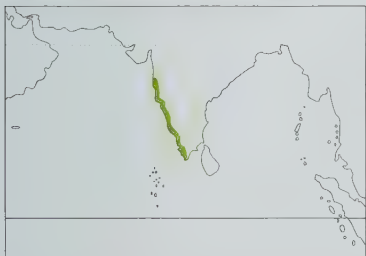


Descriptive notes. 30-36 cm. Very similar to *P. cyanocephala* but has forecrown, cheeks and ear-coverts rosy pink hindercrown to ear-coverts bluish lilac, back and rump green, no bluish green band bordering black collar-line, underwing-coverts green not bluish green, tail shorter with tips of central feathers pale yellow. Female has dull bluish grey head, variable yellow collar. Immature has green head. Race *juneae* generally yellower, with larger red wing-patch.
Habitat. Well-wooded country, open forest and the edges of cultivated clearings, to at least 1000 m.
Food and Feeding. No information.
Breeding. Mar-Apr in Myanmar; nestlings and juveniles for sale Mar-May in Thailand indicate rather longer season. Nest reportedly as in *P. cyanocephala*, but holes in old walls and ruins also used. Nestling period, in captivity, c. 6 weeks.
Movements. Local seasonal movements reported in SW Myanmar, where birds common in Mar-Apr, otherwise scarce.
Status and Conservation. Not globally threatened. CITES II. Apparently abundant in Myanmar around 1900, but now much reduced in numbers, though status better than in Thailand, where habitat loss, trade and general persecution of *Psittacula* parrots as pests have caused the species to become uncommon or rare. International trade records showed 836 birds exported in period 1981-1985, but 6873 in period 1986-1990, chiefly from Vietnam and Thailand, causing concern that local populations may have been affected adversely; around 1930 the species was considered nowhere common in Indochina.
Bibliography. Ali & Ripley (1981), Anon. (1993), Baumgärtner (1997b), Biswas (1951b), Christison *et al.* (1946), Deignan (1945), Delacour & Jabouille (1931), Échécopar & Hüe (1978), Hargreaves (1960), Harrison & Holyoak (1970), Harvey (1990), Inskipp *et al.* (1996), Lekagul & Round (1991), Ripley (1982), Robson *et al.* (1989), Round (1988), Smythies (1986).

145. Malabar Parakeet
Psittacula columboides

French: Perruche de Malabar **German:** Taubensittich **Spanish:** Cotorra de Malabar
Other common names: Blue-winged Parakeet

Taxonomy. *Palaeornis columboides* Vigors, 1830, Aneichardi, Travancore. Monotypic.
Distribution. Western Ghats, SW India.



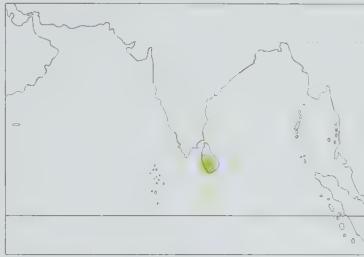
Descriptive notes. 36-38 cm. Upper mandible red with yellowish tip, lower dull brownish; area from bill to around eye bluish green; rest of head warm greyish, with complete black collar bordered turquoise below, shading immediately into grey of upper body; wing-coverts green edged buff, outer wing-coverts and primaries deep blue; belly and thighs light green, rump light turquoise, tail deep blue centrally, green laterally, marginally tipped yellow. Female lacks turquoise in neck-ring, with mantle and breast pale green, black bill. Immature replaces all grey with green.
Habitat. Tropical evergreen and moist deciduous forest, secondary growth, abandoned plantations, and adjacent cultivated clearings, from low-lands to 1600 m, but chiefly at 450-1000 m.
Food and Feeding. Grain, seeds and fruits especially of figs (*Ficus*), also buds, petals and nectar, notably *Erythrina* and *Grevillea* plants. A crop pest on *Sorghum*, other cereals, vetches *Dolichos* and orchard fruit.
Breeding. Dec-Mar. Nest in hole in tree 6-30 m from ground (high trees preferred), with ironwood (*Mesua ferrea*) and *Grewia tilifolia* particularly favoured. Usually 4-5 eggs (average clutch 4-63); incubation 23 days (27 in captivity) by both sexes, but mostly by female; female tends young except at end of nestling period, when male does so; nestling period 32 days. Seemingly high breeding success.
Movements. Resident, but some nomadism in response to food availability occurs.
Status and Conservation. Not globally threatened. CITES II. A BirdLife "restricted-range" species. Common throughout core of range. Clearance of forest in parts of the Western Ghats must have reduced range, but not to a degree where serious risk exists.

Bibliography. Ali (1996), Ali & Ripley (1981), Chakravarthy & Purna Chandra Tejasvi (1992), Chauhan (1996), Curr (1971), Jayewardene (1963), Percival (1910), Ripley (1982), Saha & Dasgupta (1992), Tavistock (1929b), Vriends (1979), Wheatley (1996).

146. Emerald-collared Parakeet
Psittacula calthropae

French: Perruche de Layard **German:** Blauschwanzsittich **Spanish:** Cotorra de Ceilán
Other common names: Layard's/Sri Lankan Parakeet

Taxonomy. *Palaeornis Calthropae* [sic] Blyth, 1849, Sri Lanka. Species name originally based on maiden name, Calthrop, of E. L. Layard's wife, so justifiably emended; sometimes erroneously listed as *calthropae*. Monotypic.
Distribution. Sri Lanka.



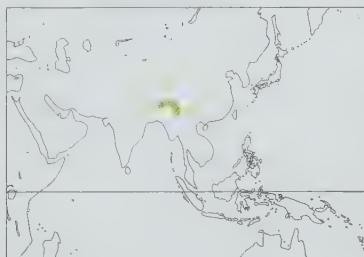
Descriptive notes. 29-31 cm. Upper mandible red with yellowish tip, lower dull brownish; forehead and area round eye to lower mandible soft green, rest of head bluish grey shading to black area on chin and sides of neck, this in turn bordered by broad emerald collar extending around neck and onto underparts: mantle, back and rump bluish grey; wings dull green, greyish on lesser and yellowish on median wing-coverts; tail deep grey-blue tipped yellow. Female has greyish black bill. Immature replaces grey with green.
Habitat. Hill forests and clearings ranging up to 2000 m, penetrating to sea-level only in parts

of wet zone in SW of island.
Food and Feeding. Fruits of *Macaranga tomentosa*, wild fig and wild cinnamon, flowers of "bomba tree", buds and nectar, with less granivory owing to more strictly arboreal habits.
Breeding. Jan-May, and often again in Jul-Sept. Nest usually high (10-25 m) in hollow limb or hole in tree, including *Pterocarpus*, *Syzygium* and *Terminalia*. Eggs 2-4; in captivity, incubation c. 3 weeks, nestling period 7 weeks.
Movements. Apparently sedentary, but altitudinal movements may occur.
Status and Conservation. Not globally threatened. CITES II. A BirdLife "restricted-range" species. This bird has suffered from the conversion of forest to plantation, and in some areas has disappeared completely. Still fairly common in Sinharaja National Heritage Wilderness Area, and in forest around Kitulgala.
Bibliography. Ali & Ripley (1981), Henry (1971), Jindasa (1961), Kotagama (1985), Kotagama & Fernando (1994), Legge (1880), Luft (1994), Phillips (1978), Ripley (1982), Wheatley (1996), Wijesinghe (1994).

147. Derbyan Parakeet
Psittacula derbiana

French: Perruche de Derby **German:** Chinasittich **Spanish:** Cotorra de Derby
Other common names: (Lord) Derby's Parakeet

Taxonomy. *Palaeornis Derbianus* Fraser, 1852, no locality, cage-bird. Monotypic.
Distribution. SW China, SE Tibet and NE Assam.



Descriptive notes. 46-50 cm. Bill red above tipped yellow, black below; narrow black frontal band stretching back to eye set in light turquoise on forehead and around eye, shading to purple on rest of head except for broad black bar extending from lower mandible below ear-coverts; nape and upperparts green with yellowish wash on median wing-coverts; underparts purple except for thighs and vent; tail bluish centrally, green laterally, yellowish below. Female lacks turquoise on head and has all-black bill. Immature duller, with green head.
Habitat. Coniferous and mixed *Pinus-Quercus* forests, *Rhododendron* alpine thick-

ets and cultivated valleys up to 4000 m.
Food and Feeding. Seeds of *Pinus tabulaeformis*, poplar catkins, barley and orchard fruit, notably peaches, and often destructive to ripening crops including maize.
Breeding. Jun in SE Tibet. Nest in hole in tree, often *Populus ciliata*; reportedly also in "sand nests", presumably in high riverbanks.
Movements. Summer visitor to NE India, May-Sept, but apparently resident in SE Tibet, persisting as high as 3300 m in winter.
Status and Conservation. Not globally threatened. CITES II. Currently considered near-threatened. Apparently fairly common within its relatively little visited range, recorded as usually occurring in large flocks.
Bibliography. Ali & Ripley (1981), Anon. (1994d), Baumgärtner (1997a), Cheng Tsohsin (1987), Échécopar & Hüe (1978), Ezra (1933), King (1983), Ludlow (1944, 1951), Meyer de Schauensee (1984), Norris (1954), Payne (1956), Ripley (1982), Stoner (1952), Tavistock (1929a), Vaurie (1965), Vit (1996b), Wheatley (1996).

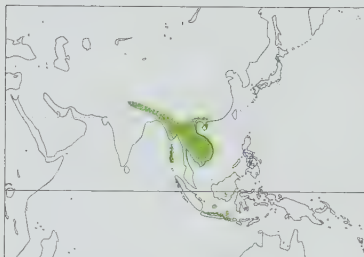
148. Red-breasted Parakeet
Psittacula alexandri

French: Perruche à moustaches **German:** Bartsittich **Spanish:** Cotorra Pechirroja
Other common names: Rose-breasted/Moustached Parakeet

Taxonomy. *Psittacus alexandri* Linnaeus, 1758, China, Bengal, Ethiopia = Java. Closest relatives probably *P. derbiana* and *P. caniceps*, despite size differences. Eight subspecies recognized.
Subspecies and Distribution.
P. a. fasciata (P. L. S. Müller, 1776) - N India E through Nepal, Bangladesh, Myanmar, Thailand, extreme N Peninsular Malaysia and Indochina to S China and Hainan.

P. a. abbotti (Oberholser, 1919) - Andaman Is.
P. a. cala (Oberholser, 1912) - Simeulue I.
P. a. major (Richmond, 1902) - Lasia and Babi Is.
P. a. perionca (Oberholser, 1912) - Nias I.
P. a. alexandri (Linnaeus, 1758) - Java, Bali and extreme S Borneo.
P. a. kangeanensis Hoogerwerf, 1962 - Kangean Is.
P. a. dammermani Chasen & Kloss, 1932 - Karimunjawa Is.

Introduced to Singapore where breeding regular since mid-1980's, but subspecies involved as yet undetermined. Population of Borneo commonly considered introduced, but this is not necessarily correct.



Descriptive notes. 33-38 cm; 133-168 g. Bill red, tipped yellow; head pale blue-grey with thin black line from cere to eye, black chin and lower cheeks; underparts pink from throat to mid-belly, then pale green; sides of neck, nape and upperparts green, with yellowish wash on median wing-coverts. Female has duller pink underparts. Immature has green head and underparts. Race *kangeanensis* has less blue in head, yellowish wing-patch; *dammermani* larger; *fasciata* has blue tinge to head, darker pink breast with light blue wash, lower mandible blackish; *abbotti* like *fasciata* but larger and paler; *cala* like *abbotti* but less blue suffusion

in pink; *major* like *cala* but larger; *perionca* like *major* but slightly smaller, belly and vent brighter.

Habitat. Moist deciduous forest, secondary growth, mangroves, teak and coconut plantations, woodland adjacent cultivation and villages, in foothill and lowland areas, generally avoiding dense evergreen closed-canopy forest.

Food and Feeding. Little specific information; nectar and flowers of *Salmalia*, *Bombax*, *Butea*, *Parkia speciosa* and *Erythrina variegata*, seeds of *Albizia*, chestnuts (*Castanea*), fruits of *Ficus*, leaf buds of teak, rice and other grain recorded.

Breeding. Generally Dec-Apr in continental Asia, including Singapore; every month but Apr on Java. Nest in hollow limb or hole in tree, often with several pairs occupying adjacent trees. Eggs 3-4; in captivity, incubation c. 28 days, and nestling period c. 50 days.

Movements. Generally sedentary but with local irregular movements sometimes coinciding with food supply changes or, in N of range, periods of cold weather.

Status and Conservation. Not globally threatened. CITES II. In continental Asia the species is generally common throughout its range, also on the Andamans where at least formerly considered the commonest bird of the islands, and may do serious local damage to crops; also considered the commonest parrot in S Indochina around 1930. However, there has been a considerable decline in numbers and range within Thailand and Laos in recent years and the species is probably uncommon in China. Moreover, with the exception of Nias (where it was common as a cage-bird in 1990), there appear to be no recent reports from many of the small Indonesian islands where it occurs (it was under potential threat from trade on Simeulue, 1981), it is only very locally common in Kalimantan, and on Java and Bali it has suffered declines and local extinctions in response to the local cagebird trade. International trade is high: a total of 66,601 live birds were recorded in the period 1987-1992, chiefly coming from Vietnam (42%), Indonesia (27%) and India (15%), and chiefly going to Singapore (28%), Japan (21%) and USA (12%).

Bibliography. Abdulali (1964), Albion & Albion (1991), Ali (1996), Ali & Ripley (1981), Ali *et al.* (1996), Cheng Tsohsin (1963, 1987), Deignan (1945, 1963), Delacour & Jabouille (1931), Dymond (1994), Étchécopar & Hue (1978), Genuise (1993), Harvey (1990), Hellebrekers & Hoogerwerf (1967), Holmes (1994a), Holmes & Burton (1987), Hoogerwerf (1949, 1962), Inskipp & Inskipp (1991), Lekagul & Round (1991), Lever (1987), MacKinnon (1988), MacKinnon & Philipps (1993), Majumdar *et al.* (1992), van Marle & Voous (1988), Medway & Wells (1976), Ripley (1944, 1982), Round (1988), Sane & Kannan (1985), Smythies (1981, 1986), Stepanyan (1995), Tikader (1984), Vane (1953), Vriends (1979).

149. Nicobar Parakeet

Psittacula caniceps

French: Perruche des Nicobar **German:** Graukopfsittich **Spanish:** Cotorra de Nicobar
Other common names: Blyth's (Nicobar) Parakeet

Taxonomy. *Paleornis caniceps* Blyth, 1846. Nicobars. Monotypic.



Distribution. Nicobar Is, on Great and Little Nicobar, Montschall and Kondul.

Descriptive notes. 56-61 cm; 224 g. Bill red above, black below; head pale grey with black frontal band extending to eye and broad black band from lower mandible and chin to sides of neck, sometimes extending as very faint pale brown collar round hindneck; rest of body grass green, tail tinged yellowish grey and tipped yellowish. Female has head strongly tinted blue, upper mandible black. Immature undescribed.

Habitat. Tall forest.

Food and Feeding. Ripe fruits of *Pandanus* extensively used.

Breeding. No information.

Movements. Sedentary.

Status and Conservation. Not globally threatened, CITES II. Currently considered near-threatened. A BirdLife "restricted-range" species. Apparently common; many birds are caught for the local cagebird trade, but much habitat remains on the islands.

Bibliography. Abdulali (1964, 1967, 1978), Ali & Ripley (1981), Collar & Andrew (1988), Collar *et al.* (1994), Harrison & Holyoak (1970), Ripley (1982), Tikader (1984), Wheatley (1996).

150. Long-tailed Parakeet

Psittacula longicauda

French: Perruche à longs brins **German:** Langschwanzsittich

Spanish: Cotorra Colilarga

Other common names: Pink-checked/Red-cheeked Parakeet

Taxonomy. *Psittacus longicauda* Boddaert, 1783, Malacca.

Five subspecies recognized.

Subspecies and Distribution.

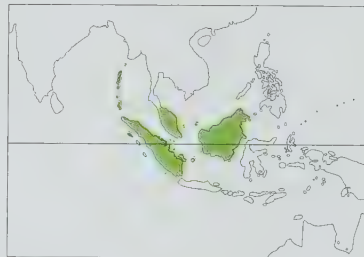
P. l. tyleri (Hume, 1874) - Andaman Is and nearby Cocos Is.

P. l. nicobarica (Gould, 1857) - Nicobar Is.

P. l. longicauda (Boddaert, 1783) - S Peninsular Malaysia and Singapore through Sumatra, Nias and Bangka to Anambas Is and Borneo.

P. l. modesta (Fraser, 1845) - Enggano I (off SW Sumatra).

P. l. defontainei Chasen, 1934 - Natuna Is (off W Borneo).



Descriptive notes. 40-48 cm; 168-196 g. Upper mandible red, lower blackish red; crown and area above line from cere to eye dark green; area from lower mandible and chin tapering onto lower sides of neck black; rest of head and nape rose pink, shading to pale yellowish green on mantle and upper back, pale bluish on lower back, green on uppertail-coverts; undersides greenish yellow shading slightly darker on belly; wings green with dull blue on primary coverts and primaries; tail deep blue centrally, outer feathers green. Female replaces rose pink on head with dull orange-red, with blue wash on ear-coverts; bill

all brownish. Immature mainly green, some orange-red tinge on sides of head. Race *defontainei* has deeper red on head, yellowish crown; *modesta* crown appears brownish, as feathers dull red mixed with green, duller brownish in female; *tyleri* crown, nape, mantle and upper back yellowish green, rump and lower back green; *nicobarica* bright green crown with yellowish green nape. Last three races larger than first two, *nicobarica* largest.

Habitat. An extreme lowland species, ranging up to 300 m but preferring areas in coastal regions, including mangroves, swamp forest (including peat swamp forest), rain forest edge, partly cleared land, oil-palm plantations, coconut groves.

Food and Feeding. Specific items include outer covering of betel nuts *Areca catechu*, papaya *Carica papaya*, ripe *Pandanus* fruit, fruits of kapor *Dryobalanops*, *Dillenia speciosa* and *Sonneratia alba*, flowers of *Acacia* and *Bombax*, seeds of *Macaranga*, *Ixonanthes*, *Vitex pybescens*, *Lagerstroemia*, *Dipterocarpus crinitus*. Can be pest in oil-palms, plucking ripe fruits to eat the soft mesocarp.

Breeding. Generally Dec-May in Malaysia; Jun in Kalimantan; Oct in Sumatra; Feb-Apr in Andamans and Nicobars. Nest in hole in tree, in one case adjacent to grass swamp, in another 10 m up in peat swamp forest; on Andamans usually in *Pterocarpus marsupium*, 4-8 m up. Breeds colonially, with multiple pairs (one count of 16) using neighbouring holes in particular tree or group of trees; 6-20 m up, but on Sumatra once 45 m up in dead limb of *Koompassia*. Eggs 2-3; in captivity, incubation 24 days.

Movements. Poorly understood fluctuations in numbers occur throughout range. In some parts of range, large flocks may build up or suddenly arrive in an area, then the species may be absent for several years. Certain statements based on single season or year's observations may not be reliable. In Membakut area of Sabah, however, birds reported to congregate in large flocks. Sept-Apr. These observations are consistent with the species being nomadic and/or trap-lining around food-resources over huge communal home ranges. Although once considered on passage only, Singapore, now judged resident although birds commute across Johor Straits.

Status and Conservation. Not globally threatened. CITES II. Very common and widespread in S Kalimantan; locally common on Sumatra, where however formerly abundant, decline being linked to loss of breeding sites in primary forest; locally common in Peninsular Malaysia, where its capacity to survive is linked to its ability to forage outside rain forest and to nest communally. Occurs in very large numbers in some areas, Brunei. Common, Andamans and Nicobars. International trade was relatively slight, 1981-1985, but in the period 1986-1990 an average 2143 birds were exported annually, mostly from Malaysia. Anticipated pest status in oil-palm plantations has not been fulfilled, probably because of inability of birds to breed in such habitat.

Bibliography. Abdulali (1964, 1967, 1978), Ali & Ripley (1981), Andrew (1992), Anon. (1993), Bucknill & Chasen (1990), Delacour & Jabouille (1931), Duckworth & Kelsh (1988), Green (1979), Hails & Jarvis (1987), Holmes (1996), Holmes & Burton (1987), Kidd (1978), Low (1993d), MacKinnon & Philipps (1993), Madoc (1976), van Marle & Voous (1988), Medway & Wells (1976), Mees (1986), Nash, A.D. & Nash (1985), Nash, S.V. & Nash (1988), Ripley (1982), Smith, G.A. (1976), Smythies (1981), Tavistock (1931), Tikader (1984), Tongyai (1994), Vriends (1979), Ward & Wood (1967), Weatherburn (1993).

151

152

ssp philippensis

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PLATE 42

inches 3
cm 7

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153

*ssp bonapartei**ssp apicalis**ssp worcesteri*

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*ssp meeki**ssp aurantifrons*

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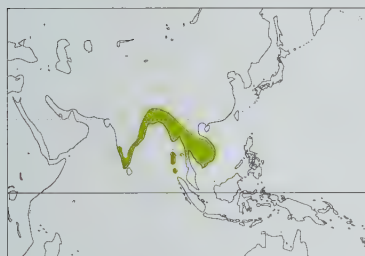
Genus *LORICULUS* Blyth, 1850

151. Vernal Hanging-parrot

Loriculus vernalis

French: Coryllis vernal **German:** Frühlingspapageichen **Spanish:** Lorículo Vernal
Other common names: Indian Hanging-parrot/Lorikeet

Taxonomy. *Psittacus vernalis* Sparrman, 1787, Cachar. Forms a superspecies with *L. beryllinus*. Birds of S India formerly placed in race *rubropygialis*, on basis of darker coloration and duller red rump, but these differences subsequently put down to individual variation and/or wear. Monotypic.
Distribution. SW, S & E India and E Nepal through S China and SE Asia to Indochina, except Malay Peninsula; Andamans, Nicobars and Mergui Archipelago.



Descriptive notes. 13 cm. Bill orangish red; plumage generally green, with yellow tone to underparts; pale blue patch on throat; rump and uppertail-coverts red; underside of flight-feathers and tail blue; legs orange. Female paler, with blue on throat reduced or lacking. Immature has dull greyish wash on face and cheeks, rump with green feathers.
Habitat. Evergreen forest, moist and dry deciduous woodlands, secondary growth, abandoned cultivated land, bamboo thickets, forest edge, orchards, tall scrub and beach-strand woodland particularly with mature casuarinas; up to 1800 m in Nilgiris.

Food and Feeding. Soft pulp of fruits and berries, chiefly figs (*Ficus*), largely supplemented by flower nectar, notably *Erythrina*, eucalypts, mistletoes and *Salmalia malabarica*; also seeds of *Casuarina*, *Tectona grandis* and bamboo. Can damage local crops of guavas (*Psidium*) and loquats (*Eriobotrya japonica*).

Breeding. Jan-Apr; in Andamans chiefly Jan-Feb. Nest in natural hollow in rotten tree stem or branch. Eggs 2-4; in captivity, incubation lasts 22 days, nestling period around 5 weeks.

Movements. In India subject to poorly understood local migrations, being a rains visitor in certain parts and a winter visitor in others.

Status and Conservation. Not globally threatened. CITES II. Very common on Andaman and Nicobar Is, reasonably so in S Thailand (common in Khao Yai National Park in NC). Common in Cambodia, around 1930. Extremely rare in China.

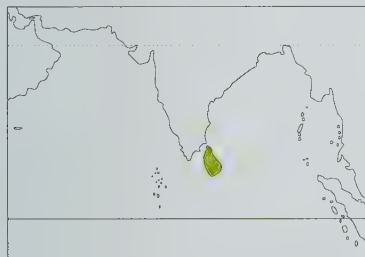
Bibliography. Abdulali (1964), Ali (1996), Ali & Ripley (1981), Ali *et al.* (1996), Buckley (1968), Chakravarty & Purna Chandra Tejasvi (1992), Cheng Tsohsin (1987), Deignan (1945), Delacour & Jabouille (1931), Donahue (1962), Fleming & Traylor (1968), Harvey (1990), Inskipp, C. & Inskipp (1991), Inskipp, T. *et al.* (1996), Lekagul & Round (1991), Medway & Wells (1976), Neelakantan (1973), Ripley (1982), Saha & Dasgupta (1992), Smythies (1986), Stepanyan (1995), Tikader (1984).

152. Ceylon Hanging-parrot

Loriculus beryllinus

French: Coryllis de Ceylan **German:** Ceylonpapageichen **Spanish:** Lorículo de Ceilán
Other common names: Sinhalese/Sri Lankan Hanging-parrot, Ceylon Lorikeet

Taxonomy. *Psittacus beryllinus* J. R. Forster, 1781, Sri Lanka. Forms a superspecies with *L. vernalis*. Monotypic.
Distribution. Sri Lanka.



Descriptive notes. 13-14 cm. Bill orangish red; entire crown red, shading on nape to golden yellow extending onto mantle and back; face yellowish green, extending in thin line above red-ringed eye and down onto sides of neck and underparts; chin and throat smudged blue; wings and tail green; rump and uppertail-coverts red; legs orange. Female has less blue throat. Immature generally lacks head and mantle colour, and may fledge with face and forehead naked.

Habitat. Wooded country, groves, plantations, coconut groves and gardens up to 1250 m, reaching 1600 m in NE monsoon.

Food and Feeding. Nectar of *Erythrina*, *Salmalia* and introduced eucalypts; seeds of *Casuarina*; fruit of "jambu" (presumably *Eugenia*); flowers and fruit of cultivated bananas.

Breeding. Jan-Sept, chiefly Mar-May. Nest in hollow in tree-stump or branch. Eggs 2-3.

Movements. Some upward altitudinal displacement appears to occur in the NE monsoon.

Status and Conservation. Not globally threatened. CITES II. A BirdLife "restricted-range" species. Widespread, and most plentiful in the SW of the island and almost absent from arid N.

Bibliography. Ali & Ripley (1981), Bloom (1960), Henry (1962, 1971), Kotagama & Fernando (1994), Legge (1880), Phillips (1978), Ripley (1982), Wait (1925), Wijesinghe (1994).

153. Philippine Hanging-parrot

Loriculus philippensis

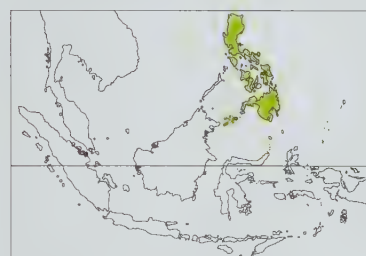
French: Coryllis des Philippines **German:** Philippinenpapageichen **Spanish:** Lorículo Filipino

Other common names: Colasisi; Black-billed Hanging-parrot (*bonapartei*)

Taxonomy. *Psittacus philippensis* P. L. S. Müller, 1776, Philippines = Luzon. Race *bonapartei* sometimes considered worthy of species status, based on black bill and grey legs, although these colours may be variable. Proposed race *panayensis* is synonym of *regulus*; *salvadorii* is synonym of *apicalis*. Ten subspecies currently recognized.

Subspecies and Distribution.

L. p. philippensis (P. L. S. Müller, 1776) - Luzon and adjacent islands, Philippines.
L. p. mindorensis Steere, 1890 - Mindoro.
L. p. bournsi McGregor, 1905 - Sibuyan.
L. p. regulus Souancé, 1856 - Tablas, Ticao, Masbate, Panay, Guimaras, Negros; probably this race on Romblon.
L. p. chrysonotus P. L. Sclater, 1872 - Cebu.
L. p. worcesteri Steere, 1890 - Samar, Leyte, Bohol.
L. p. siquijorensis Steere, 1890 - Siquijor.
L. p. apicalis Souancé, 1856 - Mindanao and adjacent islands.
L. p. dohertyi Hartert, 1906 - Basilan.
L. p. bonapartei Souancé, 1856 - Sulu Archipelago.



Descriptive notes. 14 cm; 31-40 g. Green, more yellowish on undersides; bill orange-red, forehead to mid-crown red bordered by narrow yellow line; golden orange patch on nape; large red patch on throat and upper breast; rump and uppertail-coverts red, sides of rump pale blue; underside of wings and tail pale blue; legs orange. Female lacks red on throat, and only small red patch on forehead; pale blue area around base of bill. Immature similar with reduced red on crown. Race *mindorensis* lacks yellowish tones around crown, nape spot reduced or absent; *bournsi* with reduced red on crown with small yellow patch; *regulus* entire hindcrown golden yellow; *chrysonotus* hindcrown to upper back golden yellow, with orange collar; *worcesteri* entire crown red, orangish yellow on nape, mantle faintly tinged orange; *apicalis* similar but mantle washed golden yellow; *dohertyi* similar but mantle more orange, breast spot larger; *siquijorensis* hindcrown and nape green, smaller throat patch; *bonapartei* with orange hindcrown and nape, bill black, legs dull greyish.

Habitat. Forest, forest edge, secondary growth, orchards, coconut groves, bushy areas, and bamboo clumps, generally in lowlands, scarcer above 1250 m.
Food and Feeding. Nectar and blossoms, e.g. of coconuts, and soft fruit such as *Ficus*.
Breeding. Mar-May. Nest recorded in hole 12 m up in dead tree bordering a forest clearing. In captivity: 3 eggs; incubation lasting 20 days; nestling period c. 5 weeks.

Movements. No information.
Status and Conservation. Not globally threatened. CITES II. Common throughout most of range; even race *bournsi* was recently found common at three sites on Sibuyan, being reported as a pest to ripening fruit crops. However, race *regulus* judged to be in immediate danger of extinction, owing to the high degree of forest loss throughout its range; race *mindorensis* is considered near-threatened; race *siquijorensis* may well now be extinct; and race *chrysonotus*, although long regarded as extinct, survives in tiny numbers at one site in C Cebu (Central Cebu National Park), the island's last remaining small patch of forest which continues to be degraded, despite theoretical protected status. The species is heavily traded within the Philippines, and apart from habitat loss the rarer subspecies may now face or in the past have suffered from trade pressures; the population on Bohol, which may represent an undescribed subspecies, is heavily trapped there and evidently already very scarce.

Bibliography. Alonzo-Pascolan (1992), Amadon & Jewett (1946), Anon. (1993), Brooks, Dutton *et al.* (1996), Brooks, Evans *et al.* (1992), Burr (1981), Danielsen *et al.* (1994), Delacour & Mayr (1946), Dickinson *et al.* (1991), DuPont (1971), DuPont & Rabor (1973a, 1973b), Dutton *et al.* (1992), Evans, Dutton & Brooks (1993), Evans, Magsalay *et al.* (1993), Gilliard (1950b), Goodman *et al.* (1995), Hachisuka (1934), Harrison & Holyoak (1970), Inskipp *et al.* (1996), Magsalay (1993), McGregor (1909-1910), Parkes & Dickinson (1991), Potter (1953), Rabor (1955, 1977), Rand (1959), Rand & Rabor (1960), Ripley & Rabor (1958), Salvadori (1891a), Sargeant (1992), Spenkelink-van Schaik (1980a).

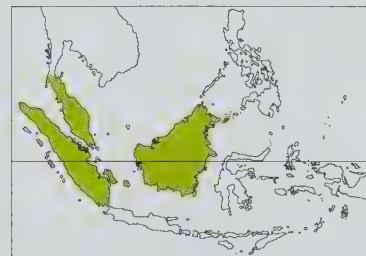
154. Blue-topped Hanging-parrot

Loriculus galgulus

French: Coryllis à tête bleue **German:** Blaukrönchen **Spanish:** Lorículo Coroniazul
Other common names: Blue-crowned/Malaysian Hanging-parrot, Malay Lorikeet

Taxonomy. *Psittacus Galgulus* Linnaeus, 1758, India; error = Malacca. Monotypic.

Distribution. S Thailand, W Malaysia, Singapore, Sumatra and associated islands, and Borneo and associated islands. Also W Java, where presumably introduced.



Descriptive notes. 12 cm; 22-35 g. Bright emerald, more yellowish on underparts; bill black; middle of crown blackish blue; throat patch red; triangular patch on mantle golden yellow; lower back yellow; rump and uppertail-coverts red; legs buff-orange. Female lacks red throat patch and yellow on lower back, much smaller crown patch. Immature duller with greatly reduced red and yellow.

Habitat. Forest and forest edge, secondary growth, peat swamp and riverine forest, bamboo patches, landward edge of mangroves, beach-strand woodland especially with casuarinas, wooded gardens, coconut groves, plantations, up to 1300 m, exceptionally to 2000 m, in Indonesia up to 500 m; possibly more abundant in selectively logged than primary forest.

On following pages: 155. Maroon-rumped Hanging-parrot (*Loriculus stigmatus*); 156. Sula Hanging-parrot (*Loriculus sclateri*); 157. Moluccan Hanging-parrot (*Loriculus amabilis*); 158. Sangihe Hanging-parrot (*Loriculus catamene*); 159. Orange-fronted Hanging-parrot (*Loriculus aurantiifrons*); 160. Green-fronted Hanging-parrot (*Loriculus tener*); 161. Green Hanging-parrot (*Loriculus exilis*); 162. Yellow-throated Hanging-parrot (*Loriculus pusillus*); 163. Flores Hanging-parrot (*Loriculus flosculus*).

Food and Feeding. Few specific records: fruit of various figs including *Ficus caulocarpa*, *F. virens*, *F. delosyae*, *F. pisocarpa*, *F. kerkenhovenii*, *F. crassiramea* and *F. stupenda*, also flowers of *Erythrina* and durian *Durio zibethinus*, and mesocarp of oil-palm fruits.

Breeding. Jan-Aug, possibly later, in Sumatra. Nest in hollow in living or dead tree, including dead *Oncosperma* palms and rubber trees in disturbed forest, 8-12 m up. Eggs 3; in captivity, nestling period c. 5 weeks.

Movements. Birds may move about widely, even ranging between adjacent islands. May trapline around a large communal home range or is truly nomadic.

Status and Conservation. Not globally threatened. CITES II. Very common and widespread throughout range except Singapore, where now very uncommon. Very popular as cage-birds. Malaysia, which exported 38,381 birds in the period 1985-1990; however, this and trade pressure elsewhere do not appear to constitute a significant impact on populations. In agricultural lowlands, requires patches of tall, semi-natural woodland for breeding sites.

Bibliography. Andrew (1992), Anon. (1993), van Balen & Lewis (1991), Barnicoat (1992), Bloom (1960), Buckley (1968), Chasen & Hoogerwerf (1941), Duckworth & Kelsh (1988), Gibson-Hill (1949), Gore (1968), Hails & Jarvis (1987), Holmes (1994b), Holmes & Burton (1987), Holmes & Nash (1991), Lekagul & Round (1991), MacKinnon & Philipps (1993), Madoc (1976), Mann (1987), van Marle & Voous (1988), Medway & Wells (1976), Nash & Nash (1988), Norgaard-Olesen (1968), Reinschmidt (1997), Silvius & Verheugt (1986), Smythies (1981), Wilkinson, Dutton & Sheldon (1991).

155. Maroon-rumped Hanging-parrot

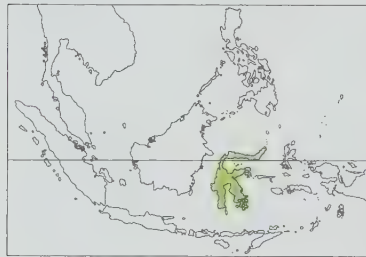
Loriculus stigmatus

French: Coryllis des Célèbes **German:** Rotplättchen **Spanish:** Lorículo de Célebes
Other common names: (Large) Sulawesi/Black-billed Hanging-parrot

Taxonomy. *Psittacus* (*Psittacula*) *stigmatus* S. Müller, 1843, Sulawesi.

Forms a superspecies with *L. sclateri*, *L. amabilis*, *L. catamene*, *L. aurantiifrons* and *L. tener*. Proposed races *croconotus* and *quadricolor* based on slight, probably individual variation. Monotypic.

Distribution. Sulawesi and adjacent islands.



Descriptive notes. 15 cm. Generally green, more yellowish on underparts; bill black; forehead to front of eye and mid-crown red; nape and mantle tinged orange; throat patch red; edge of wing red; rump and uppertail-coverts maroon; legs orange. Female lacks red on crown; throat patch often reduced. Immature similar, with throat patch yellowish and wing edge yellowish, bill and legs duller.

Habitat. Inhabits primary and tall secondary lowland and hill forest, forest edge, lightly wooded cultivation and scrub, mangrove and coconut plantations, occurring from sea-level to 1000 m.

Food and Feeding. Nectar from blossoms of *Eugenia*, flowers of *Ceiba pentandra* and soft fruits such as figs (*Ficus*) and *Tamarindus*.

Breeding. Jan-Feb, Apr-Jun and Aug. Nest in hole in bamboo or broken tree-trunk. Two young recorded in nest.

Movements. Apparently nomadic or migratory: in S Sulawesi recorded as most numerous, Oct-Dec.

Status and Conservation. Not globally threatened. CITES II. Considered widespread and common throughout range, occurring in wide variety of habitats including several extensively modified by humans.

Bibliography. Andrew (1992), Baltzer (1990), van Bemmelen & Voous (1951), Coates & Bishop (1997), Coomans de Ruiter (1951), Coomans de Ruiter & Maurenbrecher (1948), Fraser & Henson (1996), Holmes & Philipps (1996), McKean (1982), Rozendaal & Dekker (1989), Stresemann (1940), Watling (1983), White & Bruce (1986).

156. Sula Hanging-parrot

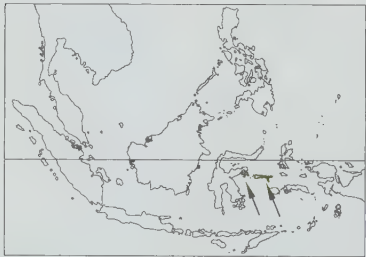
Loriculus sclateri

French: Coryllis des Sula **German:** Sulapapageichen **Spanish:** Lorículo de las Sula

Taxonomy. *Loriculus sclateri* Wallace, 1863, Sula Islands.

Forms part of the *L. stigmatus* superspecies. Sometimes treated as conspecific with *L. amabilis* and *L. catamene*. Proposed race *ruber* from Banggai based on character present in at least some *L. amabilis*, probably age-related. Monotypic.

Distribution. Sula and Banggai Is (off EC Sulawesi).



Descriptive notes. 14 cm. Considerably larger than *L. amabilis* with no red on head and a large orange patch, often with large red centre, on lower mantle and upper back. Female similar. Immature has duller red areas, and orange area on back dull and ill-defined, with little or no red.

Habitat. Primary and secondary forest and adjacent partially cleared lands.

Food and Feeding. No information.

Breeding. No information.

Movements. No information.

Status and Conservation. Not globally threatened. CITES II. A BirdLife "restricted-range"

species. Reported to be common throughout both island groups.

Bibliography. Andrew (1992), Bishop (1992), Coates & Bishop (1997), Davidson *et al.* (1995), Sujatnika *et al.* (1995), White & Bruce (1986).

157. Moluccan Hanging-parrot

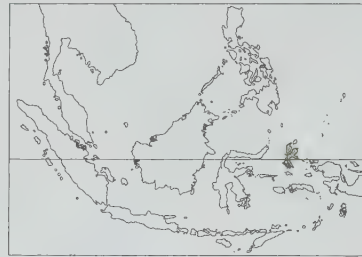
Loriculus amabilis

French: Coryllis des Moluques **German:** Zierpapageichen **Spanish:** Lorículo Amable

Taxonomy. *Loriculus amabilis* Wallace, 1862, Halmahera.

Forms part of the *L. stigmatus* superspecies. Sometimes treated as conspecific with *L. sclateri* and *L. catamene*. Monotypic.

Distribution. Halmahera and Bacan in N Moluccas.



Descriptive notes. 11 cm. Emerald green, slightly darker on upperparts and wings; bill black; forehead to mid-crown red; throat patch, edge of wing, and rump and uppertail-coverts red; legs orange. Female has green crown and less red on throat, vague orange bloom on mantle. Immature has yellowish throat patch and forewing.

Habitat. Primary and secondary forest areas, selectively logged forest, coastal *Casuarina* trees, tall mangroves and edges of agricultural clearings, occasionally coconut groves. Generally found in lowlands, but this may simply be because most of the preferred secondary

habitat is in the lowlands, not a genuine altitude preference.

Food and Feeding. Birds have been seen foraging in the crowns of tall flowering and fruiting *Erythrina* and *Casuarina* trees, *Rhizophora* mangroves and coconut palms.

Breeding. No information.

Movements. Known to make diurnal movements over long distances.

Status and Conservation. Not globally threatened. CITES II. A BirdLife "restricted-range" species. Overall, moderately common; rare in primary forest, commoner in secondary forest.

Bibliography. Andrew (1992), Coates & Bishop (1997), Inskipp *et al.* (1996), Lambert & Young (1989), Sujatnika *et al.* (1995), White & Bruce (1986).

158. Sangihe Hanging-parrot

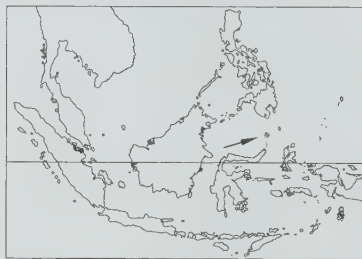
Loriculus catamene

French: Coryllis des Sangi **German:** Rotsteißpapageichen **Spanish:** Lorículo de la Sangihe

Taxonomy. *Loriculus catamene* Schlegel, 1873, Great Sangihe Island.

Forms part of the *L. stigmatus* superspecies. Sometimes treated as conspecific with *L. sclateri* and *L. amabilis*. Monotypic.

Distribution. Sangihe I, NE of Sulawesi.



Descriptive notes. 12 cm. Similar to *L. amabilis* but edge of forewing yellowish green, undertail-coverts orange-red edged green, tail tipped red; lacks red on forecrown.

Habitat. Primary and secondary forest, mixed orchards, coconut groves, in lowlands and hills, from sea-level up to 900 m.

Food and Feeding. No information.

Breeding. No information.

Movements. No information.

Status and Conservation. **ENDANGERED.** CITES II. A BirdLife "restricted-range" species. This bird has suffered from the extensive clearance of original vegetation on its

single small island, but fears of its extinction in the 1980's have happily been allayed by fieldwork in 1995 and 1996 which has found it common in some previously undocumented forested areas.

Bibliography. Andrew (1992), Coates & Bishop (1997), Collar & Andrew (1988), Collar *et al.* (1994), Inskipp *et al.* (1996), Riley (1997), Sujatnika & Jepson (1995), Sujatnika *et al.* (1995), White & Bruce (1986), Whitten, Bishop *et al.* (1987).

159. Orange-fronted Hanging-parrot

Loriculus aurantiifrons

French: Coryllis à front orange **German:** Goldstirnpapageichen **Spanish:** Lorículo Papú
Other common names: Papuan Hanging-parrot, Bat Lorikeet

Taxonomy. *Loriculus aurantiifrons* Schlegel, 1873, Misool.

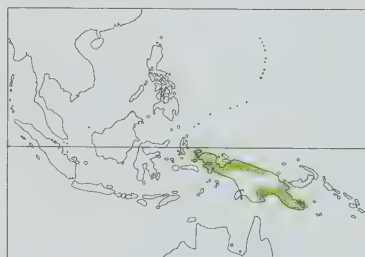
Forms part of the *L. stigmatus* superspecies. Often considered to include *L. tener*. Three subspecies currently recognized.

Subspecies and Distribution.

L. a. aurantiifrons Schlegel, 1873 - Misool in W Papuan Is.

L. a. batavorum Stresemann, 1913 - Waigeo in W Papuan Is, and W & NW New Guinea.

L. a. meeki Hartert, 1895 - E New Guinea, and islands of Fergusson, Goodenough and Karkar.



Descriptive notes. 10 cm; 13-16 g. Green, more yellowish on underparts; bill black; forehead golden yellow; throat patch red; rump and uppertail-coverts red, with yellow sides to rump; undersides of wings greenish blue; legs dull yellowish. Female has forehead bluish green, smaller red throat patch. Immature like female without red throat patch. Race *batavorum* has less yellow on forehead; *meeki* supposedly but doubtfully larger, less yellow on forecrown.

Habitat. Lowland forest and secondary growth, noted visiting casuarinas, pines and palms; commonly up to 300 m, more rarely

up to 1200 m or even 1600 m.

Food and Feeding. Nectar, buds and blossoms, possibly also seeds and lerps. White paste in stomach was apparently "flower sap".

Breeding. Sept-Oct. Nest in small hollow in narrow tree; hole in an arboreal termitarium seen visited, but possibly only for roosting. Eggs reportedly four.

Movements. No information.

Status and Conservation. Not globally threatened. CITES II. Regarded as commoner on Karkar than on mainland, but this may in part reflect greater observational difficulties, or else the species prefers more disturbed areas, in which it has been found to be common; has been reported as rare in primary habitats.

Bibliography. Andrew (1992), Anon. (1994a), Beehier *et al.* (1986), Bell (1970d), Coates (1985), Diamond (1972a), Diamond & LeCroy (1979), Gregory (1995a, 1995b), Mayr & Rand (1937), Mees (1965), Rand (1942b), Rand & Gilliard (1967), Schodde & Hitchcock (1968), Sims (1956).

160. Green-fronted Hanging-parrot

Loriculus tener

French: Coryllis des Bismarck

Spanish: Loriculo de las Bismarck

German: Bismarckpapageichen

Other common names: Bismarck Hanging-parrot

Taxonomy. *Loriculus tener* P. L. Selater, 1877, Duke of York Island.

Forms part of the *L. stigmatus* superspecies. Commonly treated as a race of *L. aurantiifrons*, but plumage distinctly different in several features, suggesting species status more appropriate. Monotypic.

Distribution. Bismarck Archipelago.



Descriptive notes. 10 cm; 12 g. Similar to *L. aurantiifrons* but forehead green, throat patch orange-red, rump and uppertail-coverts yellow; underside of tail pale blue.

Habitat. Forest and secondary growth along coasts.

Food and Feeding. No information.

Breeding. No information.

Movements. No information.

Status and Conservation. Not globally threatened. CITES II. Currently considered near-threatened. A BirdLife "restricted-range" species. Fairly common but perhaps seasonally or locally hard to find.

Bibliography. Coates (1985), Collar *et al.* (1994), Dahl (1986), Finch & McKean (1987), Gilliard & LeCroy (1967a).

161. Green Hanging-parrot

Loriculus exilis

French: Coryllis vert

German: Däumlingspapageichen

Spanish: Loriculo Exiguo

Other common names: Red-billed/Pygmy/Small Sulawesi Hanging-parrot

Taxonomy. *Loriculus exilis* Schlegel, 1866, Tulabulo, Sulawesi.

Forms a superspecies with *L. pusillus* and *L. flosculus*, and sometimes considered conspecific with latter. Monotypic.

Distribution. Sulawesi.



Descriptive notes. 10-11 cm. Green, more yellowish on underparts; bill red; thin red spot on throat, bordered bluish below; rump and uppertail-coverts red; legs orange. Female has red throat patch reduced or absent. Immature has no throat patch, yellowish bill and legs.

Habitat. Hill and lowland forest, occasionally mangroves and trees in open country, from sea-level to 1000 m.

Food and Feeding. Figs (*Ficus*), nectar and blossoms.

Breeding. Feb and Aug. Nest in hole in dead palm.

Movements. Probably nomadic, following the flowering of trees; in May 1871, after several months with only a single observation, large flocks appeared at the seaboard in extreme N Sulawesi, frequenting mangroves.

Status and Conservation. Not globally threatened. CITES II. A BirdLife "restricted-range" species. Overlooked or decidedly local, generally in small numbers. Uncommon to rare, Dumoga-Bone National Park. Generally low numbers in trade, but 2131 reported by Indonesia in 1991; zero quotas were set in 1994 and 1995.

Bibliography. Andrew (1992), Andrew & Holmes (1990), Coates & Bishop (1997), Harrison & Holyoak (1970), Holmes & Philipps (1996), McKean (1982), Rozendaal & Dekker (1989), Sujatnika *et al.* (1995), Watling (1983), White & Bruce (1986).

162. Yellow-throated Hanging-parrot

Loriculus pusillus

French: Coryllis à gorge jaune

German: Elfenpapageichen

Spanish: Loriculo de Java

Taxonomy. *Loriculus pusillus* G. R. Gray, 1859, no locality.

Forms a superspecies with *L. exilis* and *L. flosculus*. Monotypic.

Distribution. Java and Bali.



Descriptive notes. 12 cm. Green, more yellowish below; orange bill; large orange-yellow patch on throat; can have very faint orange band on nape; rump and uppertail-coverts red; legs pale orange. Female has smaller throat patch. Immature undescribed.

Habitat. Lowland swamp forest, montane forest, more open areas with *Casuarina* trees, up to 1850 m.

Food and Feeding. Observed feeding in flowering *Erythrina* trees, in *Ficus*, and at *Cassia siamea* flowers.

Breeding. Apr-May. Nest in hollow in tree, often a palm trunk or an old barbet hole; once

in top of tree-fern at the edge of primary forest. Eggs 2.

Movements. No certain information but considered probably nomadic.

Status and Conservation. Not globally threatened. CITES II. Currently considered near-threatened. Considered generally uncommon throughout range in both Java and Bali.

Bibliography. Andrew (1985, 1992), van Balen *et al.* (1988), Collar *et al.* (1994), Hellebrekers & Hoogerwerf (1967), Hoogerwerf (1949), Inskipp *et al.* (1996), MacKinnon (1988), MacKinnon & Philipps (1993), Mason (1989), Nijman & Sözer (1996), Parrott & Andrew (1996), Rensch (1930).

163. Flores Hanging-parrot

Loriculus flosculus

French: Coryllis de Wallace

German: Florespapageichen

Spanish: Loriculo de Flores

Other common names: Wallace's Hanging-parrot

Taxonomy. *Loriculus flosculus* Wallace, 1864, Flores.

Forms a superspecies with *L. exilis* and *L. pusillus*, and sometimes considered conspecific with former. Monotypic.

Distribution. Flores (Lesser Sunda).



Descriptive notes. 11-12 cm. Green, lighter on underparts; bill red; throat with elongated red spot; nape tinged orange; rump and uppertail-coverts red; legs orange. Female has red on throat reduced or sometimes absent. Immature undescribed.

Habitat. Primary semi-evergreen forest, chiefly 800-1000 m but with records down to 450 m.

Food and Feeding. Most sightings in 1993 were in fruiting fig trees, and dependence or specialisation on this food resource judged likely.

Breeding. No information.

Movements. No information.

Status and Conservation. **VULNERABLE.**

CITES II. A BirdLife "restricted-range" species. Surveys in 1993 found it to be locally common in the Tanjung Kerita Mese proposed protected area, near Paku, but as little forest below 1000 m is included within existing protected areas on the island the species is considered vulnerable to rapid current habitat loss. In 1983 and 1984 total of 70 birds were reported as exported from Indonesia, and capture quotas were set for the species in most years down to 1993, although no trade was recorded. Commercial importation into the EC has been banned since Dec 1989.

Bibliography. Andrew (1992), Anon. (1993), Butchart *et al.* (1993, 1996), Coates & Bishop (1997), Collar *et al.* (1994), Jepson & Monk (1995), Robson (1988), Schmutz (1977, 1978), Sujatnika & Jepson (1995), Sujatnika *et al.* (1995), White & Bruce (1986).



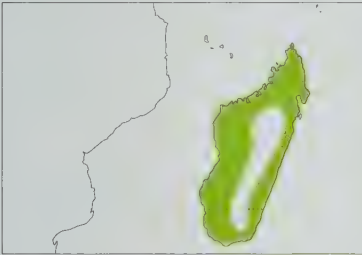
Genus *AGAPORNIS* Selby, 1836

164. Grey-headed Lovebird

Agapornis canus

French: Inséparable à tête grise **German:** Grauköpfchen **Spanish:** Inseparable Malgache
Other common names: Madagascar Lovebird

Taxonomy. *Psittacus canus* J. F. Gmelin, 1788, Madagascar and Mauritius.
Two subspecies recognized.
Subspecies and Distribution.
A. c. canus (J. F. Gmelin, 1788) - W & E Madagascar.
A. c. ablectanea Bangs, 1918 - S Madagascar.
Introduced or thought to be introduced (presumed *canus*) to Comoros, Seychelles, Mauritius (failed), Rodrigues and Zanzibar (failed).



Descriptive notes. 15 cm; 25-31 g. Male has pale grey from head to upper breast; green upperparts, brighter on rump; yellow green underparts; black underwing-coverts. Bill whitish grey. Female more uniform green, with green underwing-coverts. Immature like female but with yellowish bill with black at base. Race *ablectanea* darker green above, less yellow below.
Habitat. Forest edges and clearings, wooded (e.g. *Medemia* palm) savanna, scrub and degraded forest, rice-fields and other cultivations bordering disturbed woodland and settlements, and less arid parts of semidesert zone: frequently seen on roads. Up to 1500 m, but generally in low-lying areas.

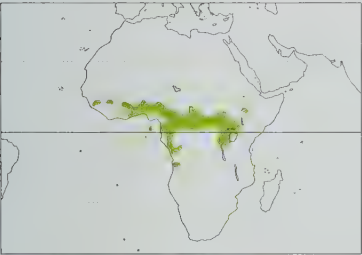
Food and Feeding. Fruits and seeds, mainly the latter, often eaten on ground; in one case (Comoros) unopened flowering shoots of the grass *Stenotaphrum micranthum*. Rice commonly sought, even in villages where set out to dry.
Breeding. Nov-Dec in Madagascar; Feb in Comoros. Nest in tree-hole, lined with finely chewed pieces of leaf, bark and grass. Eggs 3-6; in captivity, incubation c. 23 days, fledging period 43 days.
Movements. Sedentary.
Status and Conservation. Not globally threatened. CITES II. Generally widespread and common, more so in coastal areas, but now judged uncommon in E (where formerly common) and rare on the High Plateau. Listed for 25 protected areas in Madagascar. Can cause damage in rice-fields. Local trade is common.
Bibliography. Adamson *et al.* (1982), Appert (1968b, 1972), Baker (1990), Bangs (1918), Barnicoat (1980), Benson (1960), Benson *et al.* (1976-1977), Britton (1980a), Cheke (1987), Cheke & Diamond (1986), Dee (1986), Delacour (1930, 1932a, 1932b), Dowsett & Forbes-Watson (1993), Goodman & Putnam (1996), Griveaud (1960), Kaudern (1922), Langrand (1990), Lavauden (1937), Lever (1987), Louette (1988), McLaughlin (1996a, 1996b), Milon *et al.* (1973), Nicoll & Langrand (1989), Pakenham (1979), Penny (1974), Pidgeon & O'Connor (1985), Pringle (1985), Rand (1936), Seitre (1997), Sibree (1915), Snow (1978), van Someren (1947), Steinbacher (1972), Turner (1991).

165. Red-headed Lovebird

Agapornis pullarius

French: Inséparable à tête rouge **German:** Orangeköpfchen **Spanish:** Inseparable Carirrojo
Other common names: Red-faced Lovebird

Taxonomy. *Psittacus pullarius* Linnaeus, 1758, Asia, Ethiopia; error = Ghana.
Two subspecies recognized.
Subspecies and Distribution.
A. p. pullarius (Linnaeus, 1758) - patchily in Guinea, Sierra Leone and N Ivory Coast, and from Ghana E to Sudan and S into W Zaire and NW Angola, mainly N of Congo basin (southern boundaries unclear); also São Tomé.
A. p. ugandae Neumann, 1908 - E Zaire to W Ethiopia, W Kenya and NW Tanzania.



Descriptive notes. 13-15 cm; 29-50 g. Bright green with orange-red forehead and throat; rump bright blue; all but central tail feathers red at base, black in centre and green at tip; underwing-coverts black. Female has less bright forehead and throat, green underwing-coverts. Immature has face yellow. Race *ugandae* has paler blue rump.
Habitat. Mixed savanna woodland, light orchard bush, isolated patches of heavier woodland and subtropical humid primary and secondary forest and forest edge, riverine bushland, riparian forest, around inselbergs in savanna, and near areas of cultivation and pasture; mostly lowlands, but in E of range up to 2000 m.

Food and Feeding. Seeds of tall grasses, including *Sorghum*, taken from ground, also fruits of guavas and apparently figs.
Breeding. Nestlings and juveniles in Oct in Nigeria; Sept in Sierra Leone; Apr-Aug and Oct in Uganda and E Zaire. In Freetown area of Sierra Leone, appears to nest invariably in ant-nests in trees; said to nest where there are arboreal ant-nests in Sudan; one nest in Nigeria was in hole in occupied ant-nest attached to bole of tree 4 m up. Eggs 3-7; in captivity, incubation by female 22 days, nestling period 42 days.

Movements. Some populations sedentary, but others seem to behave as short-distance migrants, and all are perhaps capable of some nomadism. Considered to be a visitor of unclear seasonal status. Kagoro, Nigeria. Numbers appear to increase, Darfur, Nov-Feb, and certainly do so in rains. Cabinda. In E Africa birds subject to considerable local movements, occurring sporadically over much of Uganda and NW Tanzania.
Status and Conservation. Not globally threatened. CITES II. Generally rather uncommon, and never reported as abundant except locally in Ethiopia. In Sierra Leone, not uncommon in N woodlands, but less common further S with isolated population on Freetown Peninsula; significant numbers trapped each year as cage-birds; male's habit of sitting prominently just outside nest for long periods leads to most nests being robbed of young. Uncommon or rare in Liberia, Ghana and Benin. Uncommon in Gashaka-Gumti Game Reserve (now National Park), and rare in Kano State and Nindam Forest Reserve, Nigeria, although commonly on sale in most main towns (far commoner in last century). Rare in the Dzanga reserves, but common in Manovo-Gounda-St Floris and Bamingui-Bangoran National Parks, Central African Republic, with breeding proved in the latter park. Fairly common along whole Chad/Sudan border, Darfur, and indeed fairly common in Sudan. Much used as a cage-bird in Angola, where not common; and evidence of small amount of trade out of São Tomé. Race *ugandae* locally common. Most recent records in Kenya thought to represent wanderers, but a population apparently persists in Kakamega Forest. Generally frequent, locally abundant, in Ethiopia.

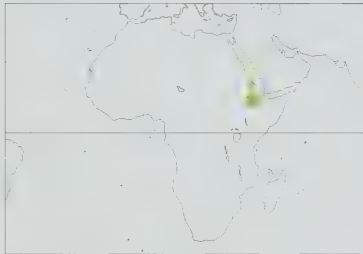
Bibliography. Atkinson *et al.* (1994), Bannerman (1953), Britton (1980a), Brown & Britton (1980), Cave & Macdonald (1955), Chapin (1939), Cheke & Walsh (1996), Claffey (1995), Dilger (1960, 1964, 1975), Dowsett & Forbes-Watson (1993), Dyer *et al.* (1986), Eccles (1988), Elgood *et al.* (1994), Evans & Balmford (1992), Fry *et al.* (1988), Green (1983, 1990), Green & Carroll (1991), Grimes (1987), Jones & Tye (1988), Lewis & Pomeroy (1989), Lippens & Wille (1976), Mackworth-Praed & Grant (1957, 1970), de Naurois (1994), Nielsen, A.V. (1964), Nikolaus (1987), Pinto (1983), Prestwick (1957), Savalli (1991), Serle (1957), Sharland & Wilkinson (1981), Short *et al.* (1990), Smith (1979a), Snow (1978), Thiollay (1985), Turner (1991), Zimmerman *et al.* (1996).

166. Black-winged Lovebird

Agapornis taranta

French: Inséparable d'Abyssinie **German:** Tarantapapagei **Spanish:** Inseparable Abisinio
Other common names: Abyssinian Lovebird

Taxonomy. *Psittacus taranta* Stanley, 1814, Pass of Taranta, Ethiopia.
Birds at higher altitudes are larger, but not subspecifically recognized. Monotypic.
Distribution. Ethiopia.



Descriptive notes. 16 cm; 49-66 g. Bright green with red bill, forehead and eye-ring; tail feathers marked yellow and barred black; flight-feathers and underwing-coverts black. Female without red on head, underwing-coverts green. Immature like female but with dusky yellow bill.
Habitat. Chiefly a highland bird, with optimal habitat, based on frequency, juniper-*Podocarpus* and olive-*Podocarpus*-juniper forest, 1800-3400 m, but also *Hagenia* forest above 2900 m and in broad-leaved tall-grass savanna and *Acacia* short-grass savanna in lower areas. Penetrates well-wooded gardens

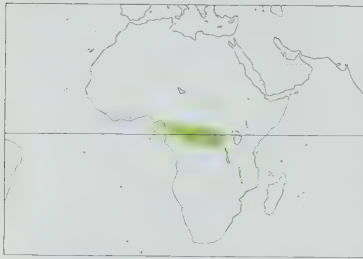
in towns, including Addis Ababa.
Food and Feeding. Seeds; berries, e.g. junipers (*Juniperus*); and fruits, e.g. figs (*Ficus*).
Breeding. Possibly every month. Mar-Nov. Nest in tree trunk or branch, holes in walls and possibly weavers' nests, lined with vegetation and feathers. Eggs 5; in captivity, incubation period 25 days, and nestling period 49 days.
Movements. None recorded.
Status and Conservation. Not globally threatened. CITES II. Widespread and more frequently seen in 1989 than previously, perhaps owing to a reduction in roadside sales for the pet trade. Present in Abijata-Shala Lakes and Bale Mountains National Parks, but elsewhere considered a minor crop pest and exposed to risk from future increases in chemical spraying to control damage by other bird species.
Bibliography. Abdu Mohamud *et al.* (1992), Albrecht (1997), Ash & Gullick (1989), Benson (1945), Cheesman & Sclater (1935), Conacher (1976), Dilger (1960, 1964, 1975), Dowsett & Forbes-Watson (1993), Friedmann (1930a), Fry *et al.* (1988), Kirmse (1993), Mackworth-Praed & Grant (1957), Major & Cheesman (1935), Moreau (1948), Pain *et al.* (1975), Smith, G.A. (1979a), Smith, K.D. (1957), Snow (1978), Succow (1990), Urban (1980), Urban & Brown (1971).

167. Black-collared Lovebird

Agapornis swindernianus

French: Inséparable à collier noir **German:** Grünköpfchen **Spanish:** Inseparable Acolorado

Taxonomy. *Psittacus Swindernianus* Kuhl, 1820, Liberia.
Three subspecies recognized.
Subspecies and Distribution.
A. s. swindernianus (Kuhl, 1820) - patchily distributed in Liberia, Ivory Coast and Ghana.
A. s. zenkeri Reichenow, 1895 - Cameroon and Gabon E to S Central African Republic and W Zaire.
A. s. emini Neumann, 1908 - C & E Zaire E to W Uganda.
Descriptive notes. 13 cm, 39-41 g. Head green, with narrow black hind-collar and yellow neck; rump deep blue; rest of upperparts dark green with blackish flight-feathers; outer tail feathers with broad orange red markings against a black subterminal bar. Immature lacks collar. Race *zenkeri* replaces yellow with red on neck and below hind-collar, *emini* with less intense red than *zenkeri*.
Habitat. Mature and secondary lowland and gallery forest, 700-1200 m, particularly favouring fig trees and cultivated clearings. Found high in primary forest trees or low in secondary growth, depending on foliage level.
Food and Feeding. Fig seeds, especially from stranglers, and the fruit of *Rauwolfia*, *Harungana* and *Macaranga*, and ripe maize on the ground; repeatedly observed coming in small flocks (5-10)



at dawn to feed on fruit of oil palm, and noted at red flowers of *Spathodea* tree. Two stomachs contained seeds and berries; insects, including caterpillars and beetle larvae, also found.

Breeding. Nestlings Jan-Feb in Gabon. No other information, though nesting in E Zaïre and Uganda likely in Jul.

Movements. Flock sizes larger in dry season, Gabon, but no evidence of migration.

Status and Conservation. Not globally threatened. CITES II. Generally reported as rare or uncommon except in Gabon, where common; this perhaps reflects observer activity and

sensitization to the species. Rare, Liberia. Not uncommon, Yapo Forest, Ivory Coast, where also recorded from Azagny and Tai National Parks. Rare Ghana, where probably now confined to forest reserves, also Bia National Park. Rare in Dzanga reserves, Central African Republic. Rarely recorded in E Africa, but reasonably common, Bwamba lowlands, Uganda.

Bibliography. Bannerman (1953), Britton (1980a), Brosset & Erard (1986), Chapin (1939), Cunningham-van Someren (1948), Demey & Fishpool (1991, 1994), Dilger (1960, 1964, 1975), Dowsett & Forbes-Watson (1993), Fry *et al.* (1988), Gatter (1988), Green & Carroll (1991), Grimes (1987), Lippens & Wille (1976), Macdonald (1980a), Macdonald & Taylor (1977), Mackworth-Praed & Grant (1957, 1970), Parkes (1960a), Short *et al.* (1990), Snow (1976, 1978), Turner (1991).

168. Rosy-faced Lovebird

Agapornis roseicollis

French: Inséparable roseorge **German:** Rosenköpfchen **Spanish:** Inseparable de Namibia
Other common names: Peach-faced Lovebird

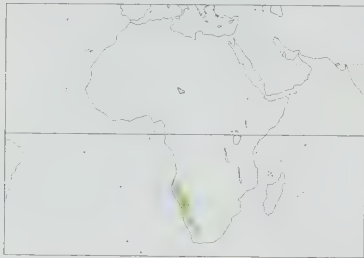
Taxonomy. *Psittacus roseicollis* Vieillot, 1818. Goodhouse, north-west Cape Province. Two subspecies recognized.

Subspecies and Distribution.

A. r. catumbella Hall, 1952 - SW Angola N almost to Luanda.

A. r. roseicollis (Vieillot, 1818) - Namibia and South Africa.

Feral population (*roseicollis*) in Simonstown, Cape Peninsula.



Descriptive notes. 15-18 cm; 43-63 g. Pale grass green, somewhat darker above, with bright blue rump; peach pink face and upper chest, darker reddish crown. Bill yellowish; fleshy white eye-ring. Immature pale buff brown on face and upper chest. Race *catumbella* richer and brighter.

Habitat. Arid woodland, scrubby hillsides and tree-lined watercourses including river canyons, in rocky terrain, where rainfall exceeds 100 mm, and where water accessible. Coastal sandstone cliffs in Kisama National Park. Escapes occur in urban areas. Up to 1500 m.

Food and Feeding. Mainly seeds of *Albizia*

(also flowers) and *Acacia*, and buds and foliage of various plants including *Euphorbia*. Pest in grain fields, notably on maize; also eats cultivated sunflowers. Very dependent on water.

Breeding. Feb-Apr, i.e. late summer, when main seed pods ripening; but Jul in N of range. Nests in rock crevices although also utilizing nests of Sociable Weaver (*Philetarius socius*) and even buildings and bridges; nest cup-shaped, made of straw, twigs and other material. Eggs 4-6; incubation c. 23 days, by female only; fledging c. 43 days.

Movements. Resident, but wanders locally, e.g. when temporary waterholes dry up.

Status and Conservation. Not globally threatened. CITES II. Flocks of hundreds at good food sources, but otherwise in small flocks. Frequently kept as a cage-bird, Angola, and the export of thousands of birds has greatly contributed to the diminution of populations in the S of the country. Present in Kisama National Park near Luanda, and in Augrabies Falls and Kalahari Gemsbok National Parks, South Africa.

Bibliography. Brickell (1982), Brooke (1984a), Ciancy (1980), Dean *et al.* (1988), Dilger (1960, 1964, 1975), Dowsett & Forbes-Watson (1993), Dyck (1971), Fischdick *et al.* (1984), Fry *et al.* (1988), Ginn *et al.* (1989), Haugaard (1995), Hoesch (1940), Lever (1985), Lever (1987), Macdonald (1957), Mackworth-Praed & Grant (1962), Maclean (1993), Mebes (1977, 1978, 1981a, 1981b, 1982), Newman (1996), Pinto (1983), Preiss & Franck (1974), Rowan (1983), Smith (1979a), Snow (1978), Traylor (1963), Winterbottom (1969).

169. Fischer's Lovebird

Agapornis fischeri

French: Inséparable de Fischer **German:** Pfirsichköpfchen **Spanish:** Inseparable de Fischer

Taxonomy. *Agapornis fischeri* Reichenow, 1887, Ussure, Tanzania.

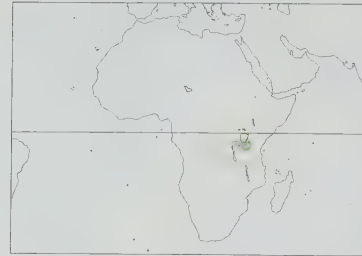
Sometimes treated as conspecific with *A. personatus*; also on occasion with *A. lilianae* and *A. nigrigenis*; perhaps best considered to form superspecies with all three. Monotypic.

Distribution. Virtually endemic to Tanzania S and E of L Victoria, but including some islands off southern shore; range centred on Serengeti. Feral populations exist in Mombasa, now apparently hybridizing with *A. personatus*. Recent records from Burundi and Rwanda appear to refer to wild birds interrupting in response to drought within normal range.

Descriptive notes. 15 cm; 42-58 g. Forehead and bill red, less intense on rest of head and shading on nape, sides of neck and throat to yellowish pink, then green on lower breast and belly; back, wings and tail dark green; uppertail-coverts dark blue. Immature has duller head.

Habitat. Wooded grasslands with *Acacia*, *Commiphora* and *Adansonia*, at 1100-2200 m, and cultivated areas to the W of its range; found to be commonest in savanna dominated by *Acacia tortilis*, with other *Acacia* and *Balanites aegyptiaca* the principal associates, and a ground layer of grasses made up of *Penisetum*, *Digitaria*, *Themeda* and *Eustachys*. In Serengeti present in all types of woodland and borassus palms (*Borassus aethiopum*); this latter is chief habitat in S of range. Riverine forest, dominated by *Ficus*, *Ziziphus*, *Tamarindus*, *Aphania*, *Garcinia* and *Eckbergia*, is an important dry season habitat. Avoids miombo woodland.

Food and Feeding. Essentially granivorous, including seeds of the grass *Penisetum mezianum* and weed *Achyranthes asper* collected from seedheads or off the ground; also takes *Acacia* seeds di-



rectly from the tree or on the ground. Fruit includes *Rhus villosa*, *Commiphora* and *Ficus capensis*. Drinks daily at waterholes and other surface water.

Breeding. Jan-Apr, Jun-Jul. Most nests 2-15 m up in dead trees or dead branches of living trees, commonly in old woodpecker or barbet holes in *Acacia tortilis* but also in natural cracks in *Commiphora trochae* branches, holes in *Adansonia* and frond-bases of *Borassus* palms; probably also sometimes in cliffs. In captivity: 3-8 eggs; incubation c. 23 days; nestling period 38 days.

Movements. Sedentary, although with local dry season movements, and irruptions in Jul-Aug some years into Rwanda and Burundi.

Status and Conservation. Not globally threatened. CITES II. Currently considered near-threatened. A BirdLife "restricted-range" species. Locally common, fairly common and widespread. Range centred on Serengeti National Park where generally common, but recorded also in Tarangire and Arusha National Parks. Total area of distribution c. 136,000 km², though possibly only 51,000 km² of suitable habitat within this. Large flocks of 1930's now greatly reduced (largest in recent survey 150); current total population estimated 290,205-1,002,210 birds, of which 103,205-815,210 lie within protected areas, the remaining 187,000 living at very low density outside them. The low densities are attributable to trade, with peak of 87,566 birds exported in 1987, and an average annual export of 56,481 in the years 1982-1990, probably representing a minimum offtake of 644,500 in the years 1982-1992, making it then the most highly traded parrot in the world. In 1992 no export quota was issued, suspending trade.

Bibliography. Anon. (1995d), Beesley (1973), Britton (1980a), Brown & Britton (1980), Cunningham-van Someren (1969, 1975), Dilger (1960, 1964, 1975), Dowsett & Dowsett-Lemaire (1993), Dowsett & Forbes-Watson (1993), Fry *et al.* (1988), Fuggles-Couchman (1984), Gaugris *et al.* (1981), Gerhart (1977), Lever (1987), Lewis & Pomeroy (1989), Mackworth-Praed & Grant (1957), Moreau (1945), Moyer (1995), Schmidt (1982), Short *et al.* (1990), Smith (1979a), Snow (1978), Thompson (1989, 1990), Thompson & Karanja (1989), Turner (1977a, 1991), Vande Weghe (1981), Zimmerman (1967), Zimmerman *et al.* (1996).

170. Yellow-collared Lovebird

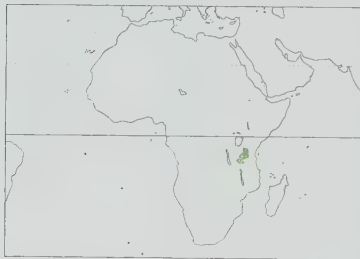
Agapornis personatus

French: Inséparable masqué **German:** Schwarzköpfchen **Spanish:** Inseparable Cubecinegro
Other common names: Masked/Black-masked Lovebird

Taxonomy. *Agapornis personata* Reichenow, 1887, Serian, Tanzania.

Sometimes regarded as conspecific with *A. fischeri*, with which it does not, however, interbreed where naturally sympatric, although where introduced at L Naivasha and a few other highland sites in Kenya these two taxa have formed stable hybrids; also on occasion lumped with *A. lilianae* and *A. nigrigenis*; perhaps best considered to form superspecies with all three. Monotypic.

Distribution. Tanzania. No evidence of natural occurrence in Kenya, although ecological barrier unclear and feral populations exist in Mombasa (now apparently hybridizing with *A. fischeri*), as well as in Tanga and Dar es Salaam. Overlaps with *A. fischeri* from S of Lake Manyara to Babati.



Descriptive notes. 13-15 cm; 43-47 g. Head blackish brown with red bill and white eye-ring; breast yellow extending as collar onto nape; belly, wings and tail green, all but central tail feathers can be subterminally marked in orange and black but individually variable. Immature duller on head.

Habitat. Well-wooded bushland, *Acacia* thorn scrub, especially with scattered baobabs *Adansonia*, to which particularly partial, at 1100-1800 m. Avoids miombo woodland.

Food and Feeding. Diet very poorly known. Seeds of grasses and millet recorded, and feral birds eat *Cassia* seeds and those of weeds

on lawns.

Breeding. Mar, Apr, Jun, Jul and Aug, i.e. mainly in dry months. Nest a bulky structure of long stalks and strips of bark, in cavities of trees, especially *Adansonia*; feral populations use eaves and apertures used by other urban birds. In captivity: 3-8 eggs; incubation, by female only, c. 23 days; nestling period c. 44 days.

Movements. Sedentary.

Status and Conservation. Not globally threatened. CITES II. Locally common, and generally fairly so. Recorded from Tarangire (common) and Ruaha National Parks. The hybrid population at Lake Naivasha comprised some 6000 individuals in 1986.

Bibliography. Britton (1980a), Brown & Britton (1980), Cunningham-van Someren (1969), Dilger (1960, 1964, 1975), Dowsett & Dowsett-Lemaire (1993), Dowsett & Forbes-Watson (1993), Fry *et al.* (1988), Gerhart (1977), Lever (1987), Lewis & Pomeroy (1989), Mackworth-Praed & Grant (1957), Moreau (1945), Short *et al.* (1990), Smith (1979a), Snow (1978), Thompson (1989, 1990), Thompson & Karanja (1989), Turner (1977a, 1991), Wüst (1997), Zimmerman *et al.* (1996).

171. Nyasa Lovebird

Agapornis lilianae

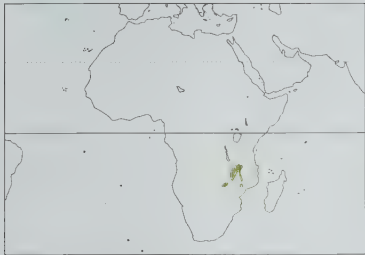
French: Inséparable de Lilian **German:** Erdbeerköpfchen **Spanish:** Inseparable del Nyasa
Other common names: Lilian's Lovebird

Taxonomy. *Agapornis lilianae* Shelley, 1894, Liwonde, Upper Shire, Malawi.

Sometimes regarded as conspecific with *A. nigrigenis*; also on occasion with *A. fischeri* and *A. personatus*; perhaps best considered to form superspecies with all three. Monotypic.

Distribution. Isolated populations in S Tanzania, NW Mozambique and S end of L Malombe, Malawi; SE Zambia along middle Zambesi to N Zimbabwe, where patchy. Introduced into E Zambia with escapes in S Namibia.

Descriptive notes. 14 cm; 28-37 g. Similar to *A. fischeri* without blue uppertail-coverts, and with reddish pink extending from forehead, around eye to chin and throat, orange-green on rest of crown. Immature has blackish ear-coverts.



Habitat. Strong association with mopane (*Colophospermum mopane*) woodland in S of range, but also occurs in belts of *Acacia* on alluvium, riparian forest and at fig trees in N; presence in S Tanzania probably linked to areas of *Acacia* woodland. Avoids miombo (*Brachystegia*) woodland in Zambia.

Food and Feeding. Grass seeds including *Hyparrhenia*, millet and wild rice (*Oryza perennis*) and various others in low vleis areas; flowers and/or seeds or fruit of *Acacia albida*, *Erythrophleum africanum*, *Vitex duarumiana* and wild mango (*Cordia africana*).

Breeding. Jan-Mar and Jun-Jul in Zambia; possibly lays Jan and Feb in Malawi; 4 young, 2 well-grown and 2 much younger, in Apr, Zimbabwe. Nest a roofed structure in crevices in mopane trees and perhaps old nests of White-billed Buffalo-weavers (*Bubalornis albigularis*). In captivity: 3-8 eggs; incubation c. 22 days; nestling period 44 days.

Movements. Apparently sedentary.

Status and Conservation. Not globally threatened. CITES II. Common in most of range. Common in large flocks at only site, Malawi; often in large flocks, Zambia. Very common locally, and overall population not large and susceptible to overtrapping, Zimbabwe. Locally common, Mozambique.

Bibliography. Baker (1991), Benson (1953), Benson & Benson (1977), Benson *et al.* (1971), Clancey (1980, 1996), Davies (1991), Dilger (1960, 1964, 1975), Dowsett & Dowsett-Lemaire (1980, 1993), Dowsett & Forbes-Watson (1993), Fothergill (1984), Fry *et al.* (1988), Ginn *et al.* (1989), Howells (1985), Irwin (1981), Mackworth-Praed & Grant (1957, 1962), Maclean (1993), Moreau (1945), Rowan (1983), Smith, G.A. (1979a), Smith, K.D. (1950), Snow (1978), Turner (1991).

172. Black-cheeked Lovebird

Agapornis nigrigenis

French: Inséparable à joues noires **German:** Rußköpfchen **Spanish:** Inseparable Cachetón

Taxonomy. *Agapornis nigrigenis* W. L. Sclater, 1906, Muguzzi River, Zambia. Sometimes treated as a subspecies of *A. lilianae*, from which separated by a 100 km block of unsuitable miombo (*Brachystegia*) woodland; also on occasion lumped in single species with

A. fischeri and *A. personatus*; perhaps best considered to form superspecies with all three. Monotypic.

Distribution. S Zambia and formerly extreme N Zimbabwe at Victoria Falls, with old uncertain records from Namibia (Caprivi Strip).



Descriptive notes. 14 cm; (in captivity) male 38 g, female 43 g. Forehead and crown dark reddish brown, hindcrown and nape yellowish green, cheeks and throat blackish brown with white eye-ring and red bill; upper breast orange pink; rest green, tail with some inconspicuous pale orange and blackish barring (sometimes concealed). Immature has black marks on base of upper mandible.

Habitat. Medium-altitude deciduous woodland, dominated by mopane (*Colophospermum mopane*) but only where adjacent to woodland dominated by *Baikiaea plurijuga*, birds using mopane in the dry season and *Baikiaea* in the

rains. Usually within reasonable distance of reliable water source, at which birds drink daily.

Food and Feeding. Seeds of *Amaranthus*, *Rottboellia exaltata*, *Rhus quartiniana*, *Albizia anthelmintica*, *Combretum massambicense* and *Syzgium guineense*, and grass seeds *Hyparrhenia* and *Eragrostis*; also young leaves of *Pterocarpus antunesiana*.

Breeding. Nov-Dec in Zambia. Nest in large mopane trees. In captivity a dome-shaped nest is built in cavities. In captivity: 3-8 eggs; incubation c. 24 days; nestling period c. 41 days.

Movements. Subject to some local movements, possibly seasonal in nature, and said to be annual in the Senanga district of Zambia.

Status and Conservation. **ENDANGERED.** CITES II. A BirdLife "restricted-range" species. Decline (or inability to recover) attributed informally to replacement in 1950's of sorghum and millet by maize (birds used to be crop pests), although also to massive exploitation in 1920's, with a report of 16,000 being captured in four weeks in 1929 for the cagebird market. Current estimated total around 10,000 in two subpopulations, 6200 in S and 3800 in N. Present in Kafue National Park.

Bibliography. Benson & Irwin (1967), Benson *et al.* (1971), Clancey (1980, 1985), Collar & Andrew (1988), Collar & Stuart (1985), Collar *et al.* (1994), Dilger (1960, 1964, 1975), Dodman (1995a, 1995b, 1996), Dodman & Katanekwa (1995), Dowsett (1971a, 1972), Dowsett & Dowsett-Lemaire (1980, 1993), Dowsett & Forbes-Watson (1993), Fry *et al.* (1988), Ginn *et al.* (1989), Irwin (1981), Killmer (1994), Lietzow (1984, 1997), Mackworth-Praed & Grant (1962), Maclean (1993), Moreau (1948), Perrin (1996), Smith, G.A. (1979a), Smith, R. (1994), Snow (1978), Them (1989).

inches 5
cm 13

ssp sibilans

173

ssp nigra

174

175

176

ssp robustus

ssp suahelicus

ssp timneh

ssp erithacus

ssp gulielmi

177

ssp massaicus

ssp reichenowi

ssp meyeri

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180

ssp transvaalensis

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ssp versteri

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ssp senegalus

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184



Tribe PSITTACINI

Genus *CORACOPSIS* Wagler, 1832

173. Vasa Parrot

Coracopsis vasa

French: Perroquet vasa **German:** Großer Vasa **Spanish:** Loro Vasa
Other common names: Greater Vasa Parrot

Taxonomy. *Psittacus Vasa* Shaw, 1812, South Africa; error = east Madagascar. Three subspecies recognized.

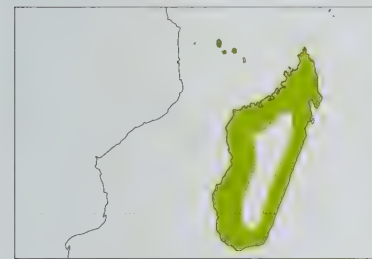
Subspecies and Distribution.

C. v. comorensis (W. K. H. Peters, 1854) - Ngazidja (Grand Comoro), Mwali (Moheli) and Ndzuani (Anjouan) in Comoros.

C. v. drouhardi Lavauden, 1929 - W & S Madagascar.

C. v. vasa (Shaw, 1812) - E Madagascar

Introduced (presumably race *vasa*) to Reunion, but apparently died out.



Descriptive notes. 50 cm. Dark brown, slightly lighter on underparts with pale grey undertail-coverts, greyish wing-coverts and edges to primaries; rosy grey bare area on face. Bill light brown when breeding, dark grey otherwise. Some breeding birds lose most head feathers to reveal yellow or orange skin. Immature generally more brownish, bare area on face smaller. Race *drouhardi* slightly paler and smaller; *comorensis* paler, with brown undertail-coverts.

Habitat. Less tied to forest than *C. nigra*, present in humid and deciduous forests, coastal plains with coconut plantations, savannas including *Medemia* palm savanna with scrub and

relict forest, rice-fields and other cultivations adjacent to woodland, and subdesert areas, noted alighting on ground on sandbanks. Generally only to 1000 m.

Food and Feeding. Fruits (in one case *Cussonia*), berries, seeds. More granivorous than *C. nigra*, capable of eating maize on the stalk.

Breeding. Oct-Jan. In W Madagascar uses baobabs and several nests can be simultaneously active in same tree. Eggs 3; in captivity, incubation 17 days, nestling period 45-49 days.

Movements. Probably sedentary, but moving locally in search of food. Birds often fly very high over forest, sometimes by moonlight.

Status and Conservation. Not globally threatened. CITES II. Commoner than *C. nigra* in W Madagascar. Listed for 28 protected areas in Madagascar, and still fairly common in many areas. Causes some crop damage, and often persecuted in S. Hunted for food, taken for trade, and officially listed in 1970's as a pest species; there is now concern that levels of exploitation are excessive, owing to the zeal with which the birds are trapped by the Betsimisaraka people, who resent their raids on ricefields. Relatively common on Comoros.

Bibliography. Adamson *et al.* (1982), Appert (1972), Atkins (1991), Benson (1960, 1981), Benson *et al.* (1976-1977), Bowen (1989), Cheke & Diamond (1986), Dee (1986), Delacour (1930, 1932a, 1932b), Dowsett & Forbes-Watson (1993), Forbes-Watson (1969), Forbes-Watson & Turner (1973), Kaudern (1922), Langrand (1990), Lavauden (1929b, 1937), Louette (1988), Louette *et al.* (1988), McBride (1996), Milon *et al.* (1973), Nicoll & Langrand (1989), Parsons (1991), Pidgeon & O'Connor (1985), Pringle (1985), Rand (1936), Robiller & Meier (1989), Smith (1985b), Steinbacher (1972), Werner (1985), Wilkinson (1990, 1994), Wilkinson & Birkhead (1995), Wilkinson *et al.* (1992).

174. Black Parrot

Coracopsis nigra

French: Perroquet noir **German:** Rabenpapagei **Spanish:** Loro Negro
Other common names: Lesser Vasa Parrot

Taxonomy. *Psittacus niger* Linnaeus, 1758, eastern Madagascar.

Proposed race *barklyi* of Seychelles apparently indistinguishable from *sibilans*. Three subspecies recognized.

Subspecies and Distribution.

C. n. sibilans Milne-Edwards & Oustalet, 1885 - Ngazidja (Grand Comoro) and Ndzuani (Anjouan) in Comoros; population on Praslin, Seychelles, may have been introduced, but appears to have colonized Curieuse through natural dispersion.

C. n. libs Bangs, 1927 - W & S Madagascar.

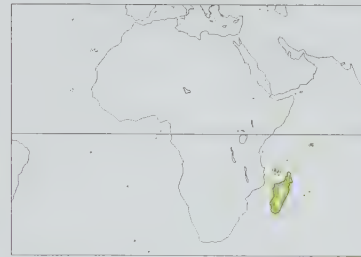
C. n. nigra (Linnaeus, 1758) - E Madagascar.

Introduced (presumably race *nigra*) to Mauritius.

Descriptive notes. 35-40 cm; 315 g (nominate *nigra*), 132-153 g (*sibilans* on Seychelles). Dark brown, with greyish brown undertail-coverts and grey cast to primaries, bill dusky. When breeding, plumage has iridescent green sheen and bill pale, and birds show a fleshy protrusion from the cloaca. Naked skin around eye rosy grey. Immature duller and browner, bare facial patch smaller. Race *libs* slightly smaller and paler; *sibilans* considerably smaller, no grey in primaries.

Habitat. Dense humid and waterlogged forest including mangroves, but also savanna, dry forest, secondary woodland, up to 2050 m. On Mt Karthala, Ngazidja, more altitudinally restricted than *C. vasa*.

Food and Feeding. Fruits, berries, flowers and seeds. More frugivorous than *C. vasa*, descending into shrubbery when foraging, and with taste for *Azela bijuga*; also recorded taking seeds of *Cinnamosma fragrans*, blossoms of *Symphonia* and fruits of *Chassalia*. On Comoros reported to



attack young cacao pods, and seen feeding on leaves, nipping edges of some, plucking others to hold in feet. On Praslin, Seychelles, main foods are *Verschaffeltia splendida*, *Averrhoa bilimbi*, *Phoenixophorium borsigionum*, *Deckenia nobilis*, *Chrysobalanus icaco* and *Ficus rubra*, with seasonal partiality for mangoes (*Mangifera indica*); buds of *Dillenia* and shoots of *Casuarina* are also targeted.

Breeding. Nov-Jan. Nests in hollow limbs or tree holes. Eggs 2-3; incubation period 18 days (14-16 recorded in captivity); fledging 5-7 weeks (37-48 days in captivity). In captivity only the female fed the young.

Movements. Sedentary, but with daily dispersals in search of food.

Status and Conservation. Not globally threatened. CITES II. Common on Madagascar, though less so than *C. vasa* in W; in 19th century considered commoner overall than *C. vasa*. Listed for 37 protected areas in Madagascar. Hunted for food, taken for trade, and officially listed in 1970's as a pest species. On Comoros relatively common on Ngazidja, rare Ndzuani. Population on Seychelles best known and perhaps best protected, since virtually confined to the Vallée de Mai Reserve, Praslin, established to conserve the remarkable coco-de-mer palm (*Laodicea maldivicum*); at least 58 were present, 1983-1984, and probably the population lies between 70 and 100. Nest-site competition from Common Mynas (*Acridotheres tristis*) may be a problem.

Bibliography. Albignac (1970), Appert (1972), Benson (1960, 1981), Benson *et al.* (1976-1977), Bullock (1990), Dee (1986), Delacour (1930, 1932a), Diamond, A.W. (1985a), Dowsett & Forbes-Watson (1993), Evans (1979), Forbes-Watson (1969), Forbes-Watson & Turner (1973), Gaymer *et al.* (1969), Goodman & Putnam (1996), James (1985, 1991), Kaudern (1922), King (1978/79), Langrand (1990), Legrand (1964), Louette (1988), Louette *et al.* (1988), Low (1983b, 1989b, 1994b), Merritt *et al.* (1986), Milon *et al.* (1973), Nicoll & Langrand (1989), Penny (1968, 1974), Pidgeon & O'Connor (1985), Rand (1936), Safford & Evans (1992), Smith (1985b), Steinbacher (1972), Wilke (1984), Wilkinson & Birkhead (1995), Wilkinson *et al.* (1992).

Genus *PSITTACUS* Linnaeus, 1758

175. Grey Parrot

Psittacus erithacus

French: Perroquet jaco **German:** Graupapagei **Spanish:** Loro Yaco
Other common names: African Grey Parrot

Taxonomy. *Psittacus erithacus* Linnaeus, 1758, Ghana.

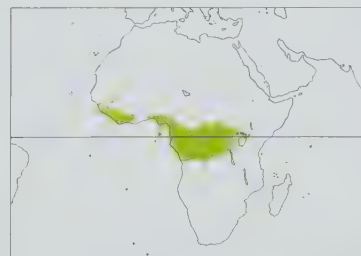
Race *timneh* may be separate species, with very little interbreeding and fairly distinctive voice. Proposed race *princeps*, from Principe in the Gulf of Guinea, is not distinguishable from nominate. Two subspecies recognized.

Subspecies and Distribution.

P. e. timneh Fraser, 1844 - Sierra Leone to Ivory Coast (at least 70 km E of R Bandama), with isolated populations in Guinea-Bissau and S Mali.

P. e. erithacus Linnaeus, 1758 - Ivory Coast E to W Kenya and NW Tanzania and S to SC Zaire and Cabinda, including Principe and (probably introduced) São Tomé.

Feral population of *timneh* alongside nominate race at Abidjan, Ivory Coast. Feral populations of nominate race in many African cities.



Descriptive notes. 28-39 cm; 402-490 g. Bare facial area around eye whitish, head scaled white on grey extending onto darker grey back and breast; wings mid-grey, primaries blackish grey; tail and tail-coverts bright red; bill and legs grey to blackish. Size, notably that of the bill, individually variable independent of age, as is the intensity of the grey and the amount of red, which sometimes extends onto the belly. Immature has dark red tail tips. Race *timneh* darker grey with dull grey-red tail; smaller.

Habitat. Generally lowland moist forest, both primary and secondary, including edges and

clearings, and also at times occupying mangroves, gallery forest, savanna woodland, cultivations; in E of range up to 2200 m. Strongly associated with oil-palms (*Elaeis guineensis*) for food and raphia palms overhanging large watercourses for roosts, but also roosts on offshore islands. Although prefers secondary forest in Gabon, on Principe densities highest in lowland primary forest, intermediate in montane primary forest, and lowest in coconut plantations.

Food and Feeding. Fruits and seeds, notably the oily flesh but not stone of oil-palm, the most preferred food in Gabon, also *Ficus*, *Heisteria*, *Dacryodes*, *Petersianthus*, *Combretum*, *Macaranga*, *Raphia*, *Harungana*, *Ceiba*, *Blighia*, *Bombax*, *Celtis*, *Caccia*, *Petersianthus*, *Parkia*, *Terminalia*; apparently attracted to red fruits, e.g. *Cola tragacantha*. Recorded also taking *Prunus africanum*, *Pseudospondias microcarpa* and maize, to which much damage can be done, Angola, although no evidence of such crop destruction, Ghana. Birds are judged to travel considerable distances in search of fruiting trees.

Breeding. Nov-Apr in W Africa, Principe and Gabon; Jun-Jul in E Africa; Jul-Dec in Zaire. Nest in hole generally high in tall tree, e.g. *Terminalia superba*, *Ceiba pentandra*, *Distemonanthus benthamianus*. Most nests solitary, but on Principe, one or two nests per tree, in Ghana rarely up to three in one tree. Eggs 2-3, rarely 4; incubation period 21-30 days or longer, probably depending on sequence of egg in clutch; young leave the nest after c. 80 days.

On following pages: 176. Brown-necked Parrot (*Poicephalus robustus*); 177. Red-fronted Parrot (*Poicephalus gulielmi*); 178. Brown Parrot (*Poicephalus meyeri*); 179. Rüppell's Parrot (*Poicephalus rueppellii*); 180. Brown-headed Parrot (*Poicephalus cryptoxanthus*); 181. Niam-niam Parrot (*Poicephalus crassus*); 182. Red-bellied Parrot (*Poicephalus rufiventris*); 183. Senegal Parrot (*Poicephalus senegalus*); 184. Yellow-fronted Parrot (*Poicephalus flavifrons*).

Movements. Resident, although in Yapo Forest, Ivory Coast, most sightings were Nov-Feb. In Kibale Forest Reserve, W Uganda, abundance related to presence or absence of fruiting trees, with largest numbers appearing when particular tree species producing a seed crop, while at other times months might pass without a sighting, which suggests birds in the region range over a very large area. Short-distance movements occur between roosting and feeding areas, e.g. from inshore island roosts, Guinea Bissau. In Ghana evidence suggests that evergreen forest is used in dry season for breeding, with semi-deciduous forest belt then being largely deserted, birds returning there only after breeding.

Status and Conservation. Not globally threatened. CITES II. Locally abundant with a very large range, hence with a high world population. However, clearly must suffer to some degree from forest destruction, especially loss of large nesting trees. More importantly, second most heavily traded parrot in world in period 1982–1989 after *Agapornis fischeri*, with an average annual export from Africa of 47,357 birds. This trade is judged to be the cause of its decline from common in the recent past to relative current rarity in Liberia, where other than in Sapo National Park only a few birds were observed, 1988–1990. Similarly in Ghana chronic exploitation since at least the 1870's, and in spite of a 1986 ban, has reduced local populations that numbered many hundreds in 1940's to twos and threes today, e.g. in Bia National Park, although the total population in the country is still estimated to be 30,000–80,000 birds. Generally uncommon in Sierra Leone, with large decline since 1930's and 1940's; now confined to mangrove belt and forests of E. Common throughout forest zone S of 8° N in Ivory Coast, where population of nominate race (E part of country) is probably 10,000–25,000; likewise in many areas in rest of range, including Nigeria, Congo and Cabinda: thus, over 500 in oil-palm plantation just outside Korup National Park, Cameroon, and abundant in the park with little sign of trade. Several roosts in Gabon accommodate 5000–6000 birds nightly, and one in the N takes 10,000. Declining but still common on Principe, despite capture of some 1500 chicks per year. An abundant resident (10–100 seen or heard daily) of the two Dzanga reserves, Central African Republic. Around Kinshasa, Zaire, large flocks (200) are now gone, possibly owing to trade, and the species is also diminishing around Congo cities. In Uganda occurs in Budongo, Bugoma and Bwamba forest reserves plus Rwenzori National Park. In Kenya now absent from several forests where previously reported, and virtually now only known from Kakamega Forest where although still locally common in 1980's only 10 reportedly survived in mid-1990's.

Bibliography. Atkinson *et al.* (1994), Bannerman (1953), Britton (1980a), Brosset & Éard (1986), Brown & Britton (1980), Callaghan (1990), Chapin (1939), Chapman *et al.* (1993), Cheke & Walsh (1996), Colston & Curry-Lindahl (1986), Cruickshank *et al.* (1993), Currey (1993), Dändliker (1992a, 1992b), Dean *et al.* (1988), Demey & Fishpool (1991, 1994), Dowsett (1990), Dowsett & Forbes-Watson (1993), Elgood *et al.* (1994), Fry *et al.* (1988), Gatter (1988), Gautier *et al.* (1993), Gore (1994), Green & Carroll (1991), Grimes (1987), Groß (1996), Helsen (1996), Homberger (1986), Janzen *et al.* (1976), Jones & Tye (1988), Juste (1996), Langberg (1958), Lewis & Pomeroy (1989), Lippens & Wille (1976), Lister (1962), Mackworth-Præd & Grant (1957, 1962, 1970), May (1996), Mulawka (1983), Mulliken *et al.* (1992), Nadler (1993), de Naurois (1981, 1983b, 1994), Pepperberg (1981, 1990, 1993, 1994a, 1994b), Pérez del Val (1996), Pinto (1983), Rauch (1978), Rodewald *et al.* (1994), Schwarzwälder (1997), Serle (1957), Short *et al.* (1990), Snow (1978), Thiollay (1985), Verschuren & Mbani Akangala Mankarika (1982), Warren *et al.* (1996), Zimmerman (1972), Zimmerman *et al.* (1996).

Genus *POICEPHALUS* Swainson, 1837

176. Brown-necked Parrot

Poicephalus robustus

French: Perroquet robuste **German:** Kappapagei **Spanish:** Lorito Robusto
Other common names: Cape Parrot

Taxonomy. *Psittacus robustus* J. F. Gmelin, 1788, east Cape Province.

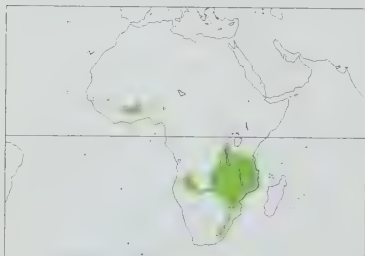
Forms a parapatric species pair with *P. gulielmi*. Race *suaehelicus* sometimes considered a separate species, incorporating *fuscicollis*, but voices claimed to be identical and morphological differences rather slight; nevertheless, notable differences in habitat preference suggest that treatment as separate species may be justified, although birds of W Africa may show more similarities to nominate *robustus* than to *suaehelicus*: within race *fuscicollis*, populations of lower R Congo and Cabinda are closest to *suaehelicus*. Three subspecies currently recognized

Subspecies and Distribution.

P. r. fuscicollis (Kuhl, 1820) - patchily from Gambia to EC Nigeria, lower R Congo and Cabinda (N Angola).

P. r. suaehelicus Reichenow, 1898 - E & CS Angola through Rwanda (one record in Uganda) to C Tanzania (Ngurus), and S to extreme N Botswana and extreme NE South Africa.

P. r. robustus (J. F. Gmelin, 1788) - E South Africa.



Descriptive notes. 30–36 cm; 225–401 g. Head, throat and neck yellowish brown; body and wings dark green; thighs and outer edges of wings orange red; tail and flight-feathers black. Bill large. Some yellow feathers or other plumage abnormality in c. 20% of specimens. Female typically has red forehead. Juvenile has brownish olive head and neck, reddish ear-coverts, without red on tibia and wing edge. Race *suaehelicus* larger, with heavier and more pointed bill, and silvery grey head and neck; *fuscicollis* smaller than *suaehelicus*, and tinged more bluish.

Habitat. Nominate *robustus* occupies montane mist-belt evergreen *Podocarpus* forest in temperate zone. Race *suaehelicus* uses many types of woodland, chiefly well developed formations such as riparian fringing forest, intervening mopane and baobab woodland, undisturbed *Baikiaea*, and open or dense tall *Brachystegia*, with lowland or mid-altitude evergreen forest used for roosting but not feeding; in Tanzania ranges mostly only up to 300 m, 925 m in Ngurus; in Angola no higher than 1500 m, but almost reaching 2000 m in Malawi, and up to 4000 m on Kivu, Zaire. Race *fuscicollis* uses mature wooded savanna, in Ivory Coast mainly in *Borassus aethiopum* palm woodland in the forest-savanna mosaic; in Gambia it prefers *Rhizophora* mangroves, and these are probably the main habitat of this race.

Food and Feeding. Seeds, nuts, berries and nectar. In South Africa fruits of the yellow-woods *Podocarpus falcatus* and *P. latifolius*, *P. henkelli*, *Harpephyllum caffrum*, *Olea capensis*, *Mimusops caffra*, *Acacia molissima*, *Melia azedarach*, *Eucalyptus*, *Ficus*, *Terminalia*, *Calodendron capense*, and *Commiphora*, also seeds of introduced *Acacia meurnsii*. In Zimbabwe most favoured food source is nut of mobola plum (*Parinari curatellifolia*), widespread in wetter areas and with extended fruiting period, Jul–Nov, with *Monotes glaber* seeds in dry season, also *Erythrina* (seeds and nectar), *Uapaca*, *Pseudolachnostylis maprouneifolia*, *Syzygium cordatum*, *S. guineense*, *Lannea discolor*, *Celtis africana*, *Ricinodendron rautanenii* and *Diospyros mespiliformis*, with a heavy dependence on *Ziziphus abyssinica* berries, Aug–Oct. *Adansonia* fruits eaten, Angola. Drinks regularly at certain places in early morning.

Breeding. Recorded most months of year in S Africa, with chief period apparently Mar–Apr in Malawi, Apr–Jun in Zambia; recorded in Jul in Zaire; Feb–Apr in Gambia. Nest chiefly in a natural hole in trunk of dead *Podocarpus falcatus* in South Africa, but elsewhere recorded in baobabs and in mangroves in Gambia. Up to 4 eggs; incubation 26–28 days; nestling period 8–11 weeks.

Movements. Some populations or parts of populations resident, with others wandering extensively during dry seasons in search of food. Fruiting of *Syzygium* and *Uapaca* appears to cause a regular migration by part of Zambezi Valley population to the central plateau of Zimbabwe (Trelawney district), birds arriving in Aug, leaving by Dec. although in Matobo National Park the period of occupancy is May–Oct. Similarly, a regular post-breeding visitor to submontane forest, Malawi in Nov–Feb. Considered probably casual visitor rather than true African migrant in Nigeria, owing to extended range of months recorded. Subject to local movements in some years in the northern savannas of Ghana. Birds in the mountain forests of the SE Cape, South Africa, undertake three different types of excursion into lower areas: daily flights, short visits with overnight stops, and more extensive periodic wanderings. These are largely prompted by the availability of *Podocarpus* fruits.

Status and Conservation. Not globally threatened. CITES II. Generally scarce, but patchily common. 1500–5000 birds. South Africa, with trapping for trade apparently the cause of decline, although populations survive in over 10 conserved areas. Common, Middle Zambezi, and in the Ulugurus, Tanzania; locally common in Zambia, but sparse in N Botswana and uncommon and very local in Angola. Generally scarce or rare throughout W Africa except Ghana, where fairly common; scarce and local in Gambia; rare and local, probably only casual in Nigeria; only one record from Sierra Leone, in Nov 1938, and only a doubtful one from Togo. Annual movement out of Zambezi Valley to central plateau, Zimbabwe, reflects food shortages in former, so progressive destruction of indigenous woodland in latter area will render the species much more vulnerable.

Bibliography. Ackermann (1978), Aspinwall (1984, 1986), Ball (1994), Bannerman (1953), Benson (1953), Benson & Benson (1977), Benson *et al.* (1971), Britton (1980a), Brooke (1984a), Chapin (1939), Cheke & Walsh (1996), Clancey (1980, 1996, 1997), Donnelly (1985), Dowsett & Dowsett-Lemaire (1993), Dowsett & Forbes-Watson (1993), Dowsett-Lemaire (1988, 1989), Elgood *et al.* (1994), Fry *et al.* (1988), Fynn (1991), Ginn *et al.* (1989), Gore (1990), Grimes (1987), Holyoak & Holyoak (1972), Howells (1985), Irwin (1981), Isert & Isert (1980), Jensen & Brogger-Jensen (1992), Lang (1969), Lippens & Wille (1976), Low (1982, 1995c), Macdonald (1978), Mackworth-Præd & Grant (1957, 1962, 1970), Maclean (1993), Penry (1994), Pinto (1983), Rowan (1983), Short *et al.* (1990), Skead, C.J. (1964, 1971), Snow (1978), Stuart & Jensen (1981), Stuart & Turner (1980), Tarboton *et al.* (1987), Thiollay (1985), Traylor (1963), Wirminghaus (1994, 1995, 1996).

177. Red-fronted Parrot

Poicephalus gulielmi

French: Perroquet à calotte rouge **German:** Kongopapagei **Spanish:** Lorito Frentirrojo
Other common names: Red-crowned/Red-headed/Jardine's Parrot

Taxonomy. *Pionus gulielmi* Jardine, 1849. River Congo.

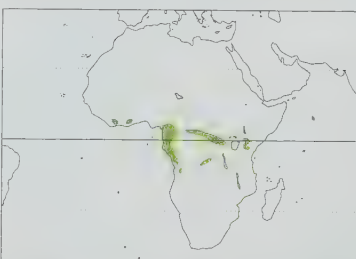
Forms a parapatric species pair with *P. robustus*. Birds of Kenya highlands formerly separated as race *permistus*; nominate race includes doubtful race *aubryanus*. Three subspecies currently recognized.

Subspecies and Distribution.

P. g. fantiensis Neumann, 1908 - Liberia E to Ghana.

P. g. gulielmi (Jardine, 1849) - Cameroon S to Cabinda (N Angola) and E to E Zaire and SW Uganda.

P. g. massaicus (Fischer & Reichenow, 1884) - W & C Kenya and N Tanzania.



Descriptive notes. 26–30 cm; 255–300 g. Green on head, underparts and rump, with forehead, crown, thighs and leading edge of wing orange red, back and wings brownish black edged green, flight-feathers and tail brownish black; iris reddish orange in male, orange brown in female. Immature duller, without red. Race *massaicus* paler, with smaller bill; *fantiensis* replaces orange red with orange, and overall smaller.

Habitat. Primary lowland rain forest, secondary forest, shade trees in coffee plantations, and adjacent clearings. In montane areas in E of range found at 1600–2550 m and even 3250

m, where occupies *Podocarpus* and *Juniperus* forests.

Food and Feeding. Seeds (e.g. from *Spathodea* pods), various palm fruits including oil-palm (*Elaeis guineensis*), large grains, pods of *Podocarpus* and *Cedrus*, wild olives, flowers or seeds of *Grevillea robusta*, and even insects.

Breeding. Evidence in W Africa feeble: members of a pair at hole in dead tree in Jul, Ivory Coast, were possibly breeding; young on wing in May, Ghana; in or around Jan, Gabon; Sept in N Zaire, Oct in C Zaire, Apr–May in S Zaire; Jan and Nov, E Africa, reportedly also Jun and Sept–Nov, with evidence for Mar. Nest in natural hollow of living tree, in one study 13 in *Hagenia abyssinica*, 4 in *Podocarpus*, 1 in *Juniperus*. Eggs 2–4; incubation period 26–28 days.

Movements. Resident, but at one site in Central African Republic large flocks noted several times a year, and occasional absences also recorded during middle months of year, Kenya.

Status and Conservation. Not globally threatened. CITES II. Rare to fairly common, W Africa, with few records, Ivory Coast, although 35 seen adjacent to Maraoúé National Park. Present in Kakum and Bia National Parks, Ghana, with flocks of up to 30 sometimes in latter. Uncommon in Korup National Park, Cameroon, fairly rare, Gabon, but common in small range, Cabinda, Angola. Uncommon in Dzanga reserves and present in Manovo-Gounda-St Floris National Park, Central African Republic. Locally common and widespread in highlands, E Africa, often forming large roosting flocks, but local declines in Kenya attributable to deforestation possibly coupled with aversion to secondary woodland. Trapping continues throughout the year on Mt Kilimanjaro and may lead to local extinction there. International

trade figures recorded for the period 1987–1993 still unclear, but apparently as many as 16,000 birds involved, with some uncertainty over countries of origin.

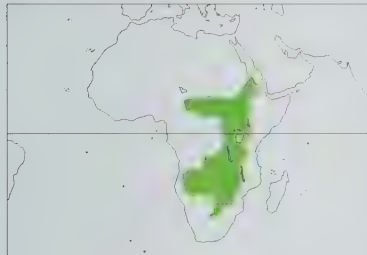
Bibliography. Bannerman (1953), Brickell (1987), Britton (1980a), Brosset & Énard (1986), Brown & Britton (1980), Chapin (1939), Cordeiro (1994), Demey & Fishpool (1991), Dowsett & Forbes-Watson (1993), Fisk (1991), Friedmann (1930a), Fry *et al.* (1988), Green & Carroll (1991), Grimes (1987), Helsen (1996), Hüton (1994a, 1994b), Holyoak, D.M. & Holyoak (1972), Holyoak, D.T. & Seddon (1990b), Jackson & Schlater (1938), Krüwer (1990), Laubscher (1997c), Lewis & Pomeroy (1989), Lippens & Wille (1976), Mackworth-Praed & Grant (1957, 1962, 1970), Morgan-Davies & Peterson (1976), Pinto (1983), Rodewald *et al.* (1994), Sessions (1966), Short *et al.* (1990), Snow (1978), Stoodley (1978b), Taylor & Macdonald (1978b), Thiollay (1985), Traylor (1963), Walters (1976), Westen (1983), Zimmerman *et al.* (1996).

178. Brown Parrot
Poicephalus meyeri

French: Perroquet de Meyer **German:** Goldbugpapagei **Spanish:** Lorito de Meyer
Other common names: Meyer's Parrot

Taxonomy. *Psittacus Meyer* Cretzschmar, 1827, Kordofan. Forms a superspecies with *P. rueppellii*, *P. cryptoxanthus* and *P. crassus*, and possibly others. Much intergradation between races, and also variation within each, indicating need for revision. Six subspecies currently recognized.

Subspecies and Distribution.
P. m. meyeri (Cretzschmar, 1827) - NE Cameroon through S Chad, N Central African Republic and N Zaire to S Sudan and W Ethiopia.
P. m. saturatus (Sharpe, 1901) - W Kenya and Uganda to E Zaire, Rwanda, Burundi and NW Tanzania.
P. m. matschiei Neumann, 1898 - SE Zaire and W & C Tanzania to E Angola, N Zambia and N Malawi.
P. m. reichenowi Neumann, 1898 - W Angola.
P. m. damarensis Neumann, 1898 - S Angola, N & C Namibia and NW Botswana.
P. m. transvaalensis Neumann, 1899 - S Zambia and N Mozambique, through E Botswana and Zimbabwe to N South Africa.



Descriptive notes. 21–25 cm; 100–150 g. Head, back, wings and tail dull brown, belly and rump green or turquoise, underparts washed yellow; variable amount of yellow on flanks, shoulders and crown (often absent from last). Underwing-coverts yellow. Immature lacks yellow markings. Race *saturatus* darker, *matschiei* with bluer tinging to green, *transvaalensis* bluer still and smaller, *reichenowi* like *matschiei* but large with no yellow on crown, *damarensis* like *matschiei* but large.

Habitat. Wide range of open woodland and riparian habitats, with obligate proximity to water in Angola and where sympatric with *P.*

rufiventris uses riverine forest not open savanna, although in drier areas than *P. cryptoxanthus* in Mozambique. Mixed lowland short- and tall-grass savanna, including those types dominated by *Terminalia laxiflora* and *Isobertinia doka*, *Combretum* bushlands and *Acacia tortilis* grassland, plus *Syzygium-Adina* riparian woodland, gallery forest, *Brachystegia* woodland along watercourses, riverine *Acacia*. In Darfur, Sudan, abundance linked to *Acacia albidia*, and this species and *A. nigrescens* also favoured in South Africa. 600–2200 m in E Africa, 900–1350 m in Malawi.

Food and Feeding. Fruits of large riverine trees such as *Azelia quanzensis*, *Melia volkensii* and *Ficus sycamorus*: seen excavating the large fruits of *Kigelia africana*; also figs, marulas, and is fond of cultivated oranges. Seed pods of trees, particularly the green pods of several *Acacia* species; only bird noted to feed on seeds of *Brachystegia* and other leguminous trees in miombo woodland. Other food-plants include *Ziziphus abyssinica*, *Uapaca nitidula*, *Monotes glaber*, *Combretum*, *Grewia*, *Sclerocarya*, *Pseudolachnostylis* and *Schotia*. Reported raiding grain fields, and recorded as taking caterpillars and other insects.

Breeding. Apr–Oct in Ethiopia, and similarly extended, patchily Feb–Dec in E Africa; nests with young in Jan in Sudan; May–Sept in Angola; Apr–May in Botswana; Jun in Malawi; Jan–Aug, chiefly Apr–May, in Zimbabwe; Mar–Jun in South Africa. Commonly uses old woodpecker holes, usually in vertical trunks at 3–7 m, with use continuing in successive years. Eggs 2–4, probably staggered; incubation 29–31 days; fledging 60–84 days.

Movements. Resident, although local movement or nomadism occurs, Botswana and South Africa.

Status and Conservation. Not globally threatened. CITES II. Common, NE Central African Republic, where present (breeding) and common in Manovo-Gounda-St Floris and Bamingui-Bangoran National Parks. Very common, W Darfur; fairly common elsewhere, Sudan. Common breeding resident, C Kenya. Seen daily, Ajai's Game Reserve, Uganda. Present but uncommon in Serengeti National Park, Tanzania. In Zambia and Malawi fairly common locally, while in Zimbabwe it is the only widespread and common parrot, but snared by local tribesmen, Middle Zambezi, because of the damage it does to ripening *Ziziphus* berries, an important human food. Common, N Botswana, sparser in E. The commonest parrot in Angola, where considered a crop pest, and present in Kangandala National Park and Giant Sable Strict Nature Reserve. Generally scarce and localized, Transvaal, and much less widespread and numerous than in last century; formerly notorious there for damage to orange orchards, also eating grain and taking maize from cobs.

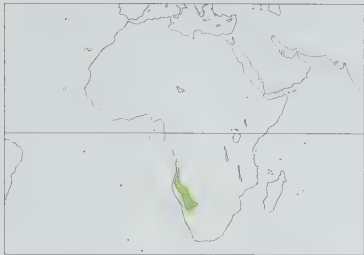
Bibliography. Bannerman (1953), Benson & Benson (1977), Benson *et al.* (1971), Bretagnolle (1993), Brickell (1985), Britton (1980a), Cave & Macdonald (1955), Chapin (1939), Clancey (1977, 1980, 1996), Dean *et al.* (1988), Dowsett & Dowsett-Lemaire (1993), Dowsett & Forbes-Watson (1993), Fry *et al.* (1988), Fuggles-Couchman (1984), Ginn (1971), Ginn *et al.* (1989), Green (1983), Greenway, K.W. (1967), Günther & Feiler (1986), Harwin (1961), Hawkins (1972), Holyoak & Holyoak (1972), Howells (1985), Irwin (1981), Lewis & Pomeroy (1989), Lippens & Wille (1976), Mackworth-Praed & Grant (1957, 1962, 1970), Maclean (1993), Massa (1995), Nikolaus (1987), Penry (1994), Pinto (1983), Rowan (1983), Schmidt (1982), Short *et al.* (1990), Snow (1978), Stubblefield (1994), Tarboton (1976), Tarboton *et al.* (1987), Wilson, N. & Wilson (1994), Wilson, R.T. (1982), Wirminghaus (1995), Wooldridge (1969), Zimmerman *et al.* (1996).

179. Rüppell's Parrot
Poicephalus rueppellii

French: Perroquet de Rüppell **German:** Rüppelpapagei **Spanish:** Lorito de Rüppell

Taxonomy. *Psittacus Rüppellii* G. R. Gray, 1849, Nunez River, French Guinea; error = Damaraland. Forms a superspecies with *P. meyeri*, *P. cryptoxanthus* and *P. crassus*, and possibly others. Monotypic.

Distribution. SW Angola and N & C Namibia.



Descriptive notes. 22–25 cm; 98–140 g. Dusky brown with slight blue wash on rump and tail-coverts. Carpal joint, leading edge of wing and underwing-coverts yellow, thighs yellow. Female similar but with rump and uppertail-coverts blue, lower belly to undertail-coverts dull blue. Immature like female but yellow absent or duller, wing feathers tipped or margined whitish.

Habitat. Well developed dry *Acacia* woodland along watercourses, also dry *Euphorbia* forests, *Brachystegia* woodland, *Adansonia*-dominated thornveld, and montane *Commiphora*/*Acacia* formations when extending upslope (generally

little above 1500 m).

Food and Feeding. Pods, e.g. of *Acacia* and *Faidherbia*; flowers, e.g. *Grewia*; fruits of *Ficus*, fruit endocarp of *Acacia* and *Commiphora*; seeds, e.g. of *Elephantorrhiza*, *Prosopis juliflora* and *Combretum imberbe*; nectar of flowering mistletoe (*Tapinanthus*), and young shoots in the canopy of taller trees and bushes; also insect larvae.

Breeding. Feb in Namibia; around Mar–Apr in Angola, but also reported later in year, with young in nest in Aug. One nest was in the dead branch of an *Acacia*, 3 m from ground, and occupied at least two years in succession; another was 5 m up in baobab, a third in an *Acacia*. Eggs 3–5; in captivity, fledging at c. 4 months.

Movements. Resident, but partly nomadic.

Status and Conservation. Not globally threatened. CITES II. Fairly common in suitable habitat, but only 9000 birds now estimated in Namibia, and its popularity among bird-fanciers coupled with its relatively restricted range means a significant reduction in overall numbers could easily occur; some illegal trading certainly occurs. Fairly common in S Angola, and frequent in Kissama National Park.

Bibliography. Brickell (1985), Clancey (1980), Dean (1974), Dean *et al.* (1988), Dowsett & Forbes-Watson (1993), Fry *et al.* (1988), Ginn *et al.* (1989), Günther & Feiler (1986), Heinrich (1958), Holyoak & Holyoak (1972), Macdonald (1957), Mackworth-Praed & Grant (1962), Maclean (1993), Manning (1995), Meyer de Schauensee (1933), Moat (1996), Nelson (1994), Newman (1996), Pinto (1983), Rowan (1983), Selman & Hunter (1996), Snow (1978), Sweeney (1995f), Traylor (1963), Wooldridge (1969).

180. Brown-headed Parrot
Poicephalus cryptoxanthus

French: Perroquet à tête brune **German:** Braunkopfpapagei **Spanish:** Lorito Cabecipardo

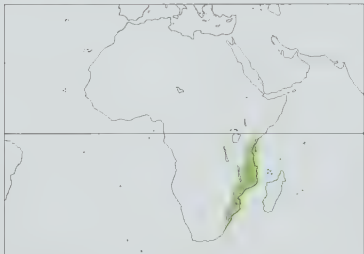
Taxonomy. *Psittacus (Poicephalus)* [sic] *cryptoxanthus* W. K. H. Peters, 1854, Inhambane, Mozambique.

Forms superspecies with *P. meyeri*, *P. rueppellii* and *P. crassus*, and possibly others. Believed to hybridize with *P. meyeri* in SE Zimbabwe, although this is perhaps not as extensive as once thought: birds with yellow shoulders may be aberrant birds of present species. In past considered conspecific with *P. crassus*. Proposed race *zanzibarius*, of Zanzibar and Pemba, indistinct from *tanganyikae*, which itself is sometimes regarded as invalid. Two subspecies currently recognized.

Subspecies and Distribution.

P. c. tanganyikae Bowen, 1930 - SE Kenya, Zanzibar and Pemba to S Malawi and Mozambique N of R Save.

P. c. cryptoxanthus (W. K. H. Peters, 1854) - SE Zimbabwe and Mozambique S of R Save to NE South Africa.



Descriptive notes. 23–25 cm. 121–156 g. Head and neck dusky brown, back and wings brownish green, rump yellowish green, tail greenish brown, underparts green, underwing-coverts yellow. Juvenile generally duller, with yellowish olive on breast and neck. Supposed hybrids with *P. meyeri* show some yellow over head and loss of green in brownish back, with bluish in rump and uppertail-coverts. Race *tanganyikae* greener above, richer below.

Habitat. Semi-arid and subhumid bush, thornveld, open wooded savanna and woodland, including areas with large baobabs or figs, riparian forest, coconut and cashew-nut plantations, edges of smallholdings, and mangroves, up to 1200 m.

Food and Feeding. Seeds, e.g. *Erythrina* and *Adansonia*; nuts; fruits, particularly of figs (*Ficus*), *Pseudocadia zambesica* and berries, e.g. of cultivated cassava; pods of *Acacia* and *Albizia gummifera*; nectar, apparently, of *Aloe marlothii* and *Kigelia pinnata*; and coconut inflorescences and green shoots of trees. Known to raid millet and maize crops.

Breeding. Apr–Oct in S Africa; May in Malawi; Jul and Sept in Mozambique; Apr, Jun and Jul in E Africa, but probably Sept–Oct on Zanzibar and Pemba. Nest in unlined hole in tree. Eggs 2–3; incubation c. 28 days, by female only; fledging period c. 12 weeks.

Movements. Resident. In Transvaal probably moves locally in response to fruiting seasons of trees.

Status and Conservation. Not globally threatened. CITES II. Locally common, E Transvaal, especially in Kruger National Park. Common, especially in *Acacia* below 600 m, Malawi. The common small parrot of Mozambique. Common Pemba. Frequent, Wasiri I, S Kenya, and common, Shimoni, but local and uncommon elsewhere in Kenya. Persistently destructive of grain crops.

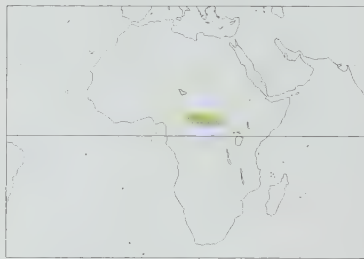
Bibliography. Benson (1953), Benson & Benson (1977), Brickell (1984c), Britton (1980a), Clancey (1977, 1980, 1996), Dowsett & Dowsett-Lemaire (1993), Dowsett & Forbes-Watson (1993), Fry *et al.* (1988), Ginn *et al.* (1989), Holyoak & Holyoak (1972), Irwin (1981), Lewis & Pomeroy (1989), Mackworth-Praed & Grant (1957, 1962), Maclean (1993), Pakenham (1979), Prestwick (1955), Rowan (1983), Ryall (1991, 1994), Short *et al.* (1990), Snow (1978), Tarboton *et al.* (1987), Taylor (1996), Vernon (1987), Wirminghaus (1995), Zimmerman *et al.* (1996).

181. Niam-niam Parrot
Poicephalus crassus

French: Perroquet des niam-niam **German:** Niamniampapagei **Spanish:** Lorito Niam-niam

Taxonomy. *Pionias crassus* Sharpe, 1884, Ndoruma, upper Uelle River.

Forms a superspecies with *P. meyeri*, *P. rueppellii* and *P. cryptoxanthus*, and possibly others. Formerly treated as a race of *P. cryptoxanthus*, to which is morphologically extremely close. Monotypic. **Distribution.** SW Chad through Central African Republic to extreme SW Sudan and extreme N Zaire.



Descriptive notes. 25 cm. Like *P. cryptoxanthus* with brown of throat extending more onto upper breast, underwing-coverts green, eye yellow (not red, as often stated). Immature duller and more yellowish, but difficult to distinguish from those of *P. meyeri* and *P. senegalus*.

Habitat. Forest-savanna mosaic, mixed lowland savanna and *Syzygium-Adina* riparian woodland, often near water; up to 1000 m.

Food and Feeding. Millet and pale yellow seeds in stomachs.

Breeding. Probably breeds from start of Aug in Zaire and Central African Republic.

Movements. Generally believed sedentary but with some nomadism and considerable daily displacements.

Status and Conservation. Not globally threatened. CITES II. The least known African parrot, assumed to be frequent to common in its poorly explored range, but this needs confirmation. Present but uncommon in Manovo-Gounda-St Floris National Park, Central African Republic. Rare, Sudan.

Bibliography. Bannerman (1953), Blancou (1939), Brickell (1985), Carroll (1988), Cave & Macdonald (1955), Dowsett & Forbes-Watson (1993), Fry *et al.* (1988), Holyoak & Holyoak (1972), Lippens & Wille (1976), Louette (1981), Mackworth-Praed & Grant (1957, 1970), Nikolaus (1987), Snow (1978).

182. Red-bellied Parrot

Poicephalus rufiventris

French: Perroquet à ventre rouge **German:** Rotbauch-Mohrenkopf **Spanish:** Lorito Ventrirrojo
Other common names: (African) Orange-bellied Parrot

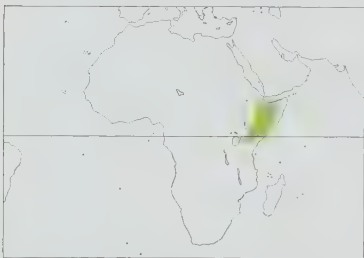
Taxonomy. *Pionus rufiventris* Rüppell, 1845, Shoa.

Probably belongs in superspecies with *P. meyeri*, *P. rueppellii*, *P. cryptoxanthus* and *P. crassus*. Two subspecies recognized.

Subspecies and Distribution.

P. r. pallidus van Someren, 1922 - E Ethiopia and Somalia.

P. r. rufiventris (Rüppell, 1845) - C Ethiopia to N Tanzania.



Descriptive notes. 25 cm; 120 g. Head, breast, upperparts and tail greyish brown; rump dusky blue; uppertail-coverts bluish green; belly and underwing-coverts orange red; thighs and vent green. Female has green belly and brown underwing-coverts. Immature like female, but with assumption of orange red in males. Race *pallidus* has paler grey on head and breast.

Habitat. Dry country, partial to *Commiphora* bush with baobabs, lowland *Acacia* short-grass savanna and *Acacia-Commiphora* thorn bush, riverine forest and bushland. Where sympatric with *P. meyeri*, uses open savanna.

Food and Feeding. *Ficus* fruits and *Acacia*

seeds taken, also ripe fruits of *Balanites aegyptiaca*, also *Cordia ovalis* and *Dalbergia melanoxylon*.

Breeding. May-Jun in Ethiopia; Nov, Jan and May in Somalia; possibly Jun-Jul in E Africa, where loosely colonial, a group of 6 pairs each occupying a single baobab 100–200 m apart over c. 30 ha in Feb.

Movements. Generally sedentary, but possibly moves out of NW Somalia in summer, as none seen Jun–Aug, and in Jul–Sept thought to move altitudinally up to 2000 m in pursuit of figs.

Status and Conservation. Not globally threatened. CITES II. Uncommon to common, Nechisar National Park, Ethiopia. Fairly common. E Africa, including Tsavo East National Park and Samburu Game Reserve in Kenya, and Mkomazi Game Reserve and Tarangire National Park, N Tanzania.

Bibliography. Archer & Godman (1937–1961), Ash & Miskell (1983), Berlioz & Roche (1963), Britton (1980a), Brown & Britton (1980), Clarke (1985), Dowsett & Forbes-Watson (1993), Duckworth *et al.* (1992), Friedmann (1930a), Fry *et al.* (1988), Harrison & Holyoak (1970), Holyoak & Holyoak (1972), Lack (1985), Lewis & Pomeroy (1989), Low (1993b), Mackworth-Praed & Grant (1957), Massa (1995), Norman (1991), Safford *et al.* (1993), Short *et al.* (1990), Snow (1978), Sweeney & De Dios (1993, 1994), Urban & Brown (1971), Zimmerman *et al.* (1996).

183. Senegal Parrot

Poicephalus senegalus

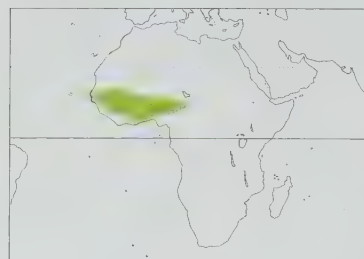
French: Perroquet youyou **German:** Mohrenkopf **Spanish:** Lorito Senegalés

Taxonomy. *Psittacus Senegalus* Linnaeus, 1766, Senegal.

Proposed race *mesotypus* from E end of range appears indistinguishable from, or only a clinal end of, nominate race. Two subspecies normally recognized.

Subspecies and Distribution.

P. s. senegalus (Linnaeus, 1766) - Gambia and Guinea-Bissau E to S Niger, N Cameroon and SW Chad. *P. s. versteri* Finsch, 1863 - NW Ivory Coast E to SW Nigeria, S of nominate *senegalus* but N of rain forest belt.



Descriptive notes. 23 cm; 120–161 g. Head grey; upperparts, breast and thighs green; belly yellow, shading to orange in centre; tail greenish brown; underwing-coverts yellow. Immature duller, with brownish head. All-yellow morphs reported, Gambia. Race *versteri* darker above, with deeper orange on centre of breast and upper belly.

Habitat. Any type of lowland savanna, but apparently favouring relatively open country with *Adansonia* or *Parkia filicoides* numerous, apparently also areas with borassus palms. Open woodland and cleared agricultural land with scattered trees, light orchard bush or isolated patches of heavier, almost closed-canopy woodland and wooded valleys; also in villages.

Food and Feeding. Fruits of *Ficus*, *Adansonia*, *Ximenia americana* and *Pterocarpus erinaceus*, seeds of *Parkia*, *Acacia albida*, *Khaya senegalensis*, *Vitex cienkowskii*, *Butyrospermum parkii* and *Sclerocarya birroea*, young buds of *Cassia*, flowers of *Melina*, plus cultivated crops such as millet, maize and peanuts.

Breeding. Jan–Oct in Gambia; Jun in Ghana; Aug in Niger; bird noted entering tree-hole in Nov, Burkina Faso; young fledging in Oct, Nigeria. Nest in hole commonly in larger branches of *Adansonia* or *Parkia*. Eggs 2–4; incubation c. 25 days; fledging in around 9 weeks.

Movements. Sedentary in places, e.g. Burkina Faso, but noted more numerous in rainy season, SW Niger, and a rainy season visitor (Sept–Dec) to parts of S Mauritania. Also seasonal, Apr–Dec, N Ghana, i.e. avoiding driest period. In Sierra Leone, known as vagrant to Freetown Peninsula with just 4 records, but reported by local bird-catchers to visit Kambia district in NW regularly in early dry season.

Status and Conservation. Not globally threatened. CITES II. Often abundant. Common, Boucle du Baoulé Biosphere Reserve, Mali. Breeds in W National Park, Niger. Common resident, Ghana and Nigeria, e.g. in latter's Falgore Game Reserve, although uncommon in Yankari Game Reserve and uncommon to frequent in Gashaka-Gumti Game Reserve (now National Park). Common in Bénoué Nord National Park, Cameroon.

Bibliography. Balança & de Visscher (1993), Bannerman (1953), de Bie & Morgan (1989), Brickell (1987), Callaghan (1982), Cheke & Walsh (1996), Claffey (1995), Coombes (1993), Crick & Marshall (1981), Dowsett & Forbes-Watson (1993), Elgood *et al.* (1994), Fry *et al.* (1988), Gee (1984), Giraudoux *et al.* (1988), Gore (1990), Green (1990), Grimes (1987), Harris (1991), Harrison & Holyoak (1970), Holyoak, D.M. & Holyoak (1972), Holyoak, D.T. & Seddon (1990a), Koster & Grettenberger (1983), Lamarche (1980), Mackworth-Praed & Grant (1970), Muhé (1988), Petersen (1957), Radicke (1984), Schneider (1982), Sharland & Wilkinson (1981), Sheasby (1991), Snow (1978), Thiollay (1985), Thonnérieux *et al.* (1989), Wilkinson & Beecroft (1985).

184. Yellow-fronted Parrot

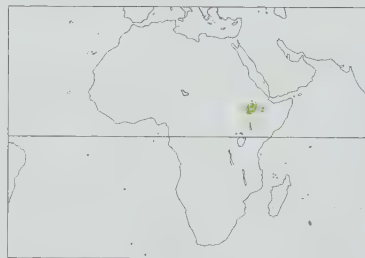
Poicephalus flavifrons

French: Perroquet à face jaune **German:** Schoapapagei **Spanish:** Lorito Carigualdo
Other common names: (African) Yellow-faced Parrot

Taxonomy. *Pionus flavifrons* Rüppell, 1845, Shoa.

Birds of SW Ethiopia formerly awarded race *auranticeps*, but racial segregation nowadays considered invalid. Monotypic.

Distribution. Ethiopia.



Descriptive notes. 28 cm; 140–205 g. Green, with forehead, crown and upper cheeks yellow, often washed orange; flight-feathers and tail dusky brown. Some yellow sometimes on wing edge and thighs. Female with less yellow, which is never washed orange. Immature yellowish olive where adult yellow.

Habitat. *Ficus-Acacia* riverine forest from 300 m, lowland subtropical humid forest, olive-*Podocarpus*-juniper forest, and *Hagenia* forest up to 3200 m. Penetrates well-wooded gardens in towns.

Food and Feeding. Poorly recorded, but presumably like other *Poicephalus* parrots. Observed feeding on ripe fruits of *Dovyalis abyssinica*, Nov.

Breeding. Unrecorded.

Movements. Sedentary, with occasional displacements, e.g. into Addis Ababa.

Status and Conservation. Not globally threatened. CITES II. Frequent to common, and considered commonest in the northerly, higher parts of its range. Present in Abijata-Shala Lakes and Bale Mountains National Parks, but elsewhere considered a minor crop pest and exposed to risk from future increases in chemical spraying to control damage by other bird species. No notable change in status in recent years.

Bibliography. Abdu Mohamued *et al.* (1992), Ash & Gullick (1989), Brickell (1987), Dowsett & Forbes-Watson (1993), Friedmann (1930a), Fry *et al.* (1988), Holyoak & Holyoak (1972), Mackworth-Praed & Grant (1957), Snow (1978), Succow (1990), Urban (1966, 1980), Urban & Brown (1971).



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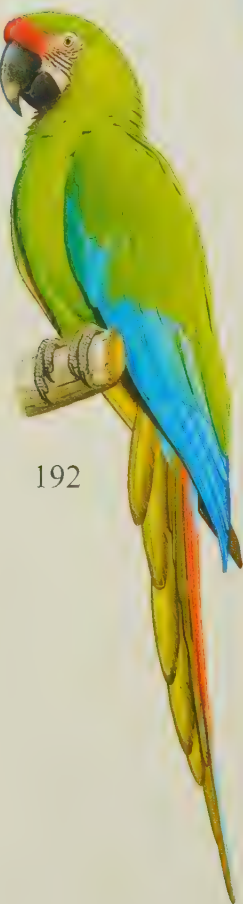
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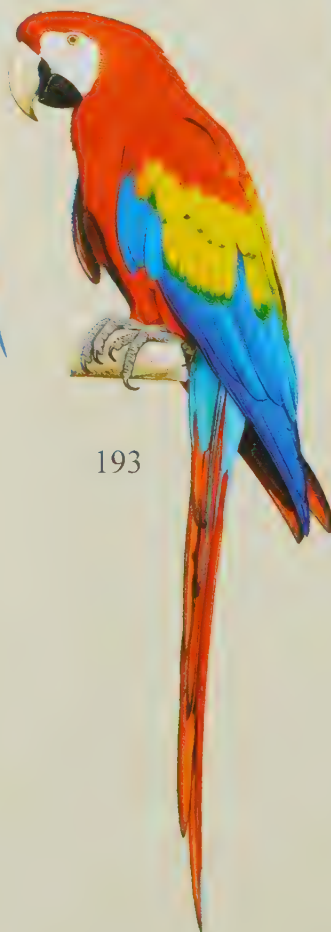
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PLATE 45

inches 10
cm 25

Tribe ARINI

Genus *ANODORHYNCHUS* Spix, 1824

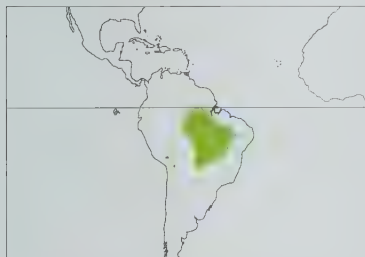
185. Hyacinth Macaw

Anodorhynchus hyacinthinus

French: Ara hyacinthe **German:** Hyazinthara **Spanish:** Guacamayo Jacinto

Taxonomy. *Psittacus hyacinthinus* Latham, 1790, Brazil. Populations in S of range have been separated as race *maximiliani* but differences minute and clinal. Monotypic.

Distribution. NC to SC Brazil ranging into extreme NW Paraguay and E Bolivia; formerly present in Amapá, N Brazil, and possibly still so.



Descriptive notes. 100 cm; 1435-1695 g. Cobalt blue throughout, more violet on wings; undersides of flight-feathers and tail grey; bare orbital ring and strip at base of lower mandible yellow. Immature has shorter tail and paler bare skin.

Habitat. Edge of tropical moist lowland forest, palm savannas, open dry woodland with gallery forest and *Mauritia* palm stands, the critical factors evidently being presence and abundance of appropriate palm foodplants.

Food and Feeding. Dependent on small number of palm species, using different species in different areas: in Amazon region

Maximiliana regia, *Orbignya martiana* and *Astrocaryum*; in the Pantanal *Scheelea phalerata* and *Acrocomia totia*; in dry NE of range *Attalea funifera* and *Syagrus coronata*, where most foraging done on ground. Other fruits also sometimes taken, and even snails *Pomacea*.

Breeding. Jul-Dec. Nest in hole in tree in lower Amazon and Pantanal, usually one of only three species in latter (and chiefly *Sterculia striata*), since only these reach sufficient size; otherwise dead palm trees and stubs commonly provide sites; in NE Brazil nests in cliff. Eggs 2, sometimes 3; incubation 27-30 days; nestling period generally 105-110 days. Usually only one young fledges, although success appears to vary between years.

Movements. Seasonal displacements over large distances are strongly indicated by fragmentary evidence from Lower Amazon, apparently geared to plant phenology.

Status and Conservation. **VULNERABLE.** CITES I. This species was reduced to an estimated 3000 birds by massive illegal trade in the period 1970-1990, with possibly as many as 10,000 being taken from the wild in the 1980's alone. In 1987 the species was placed on Appendix I of CITES, but for a time this only stimulated greater demand. In the 1990's several long-term studies of the species have started, in part coupled with conservation initiatives, often involving ecotourism, environmental education and nest-box deployment, at certain ranches in the Pantanal. However, local trapping for feathers and food may persist, as well as destruction of nest-sites either for farming or to obtain birds, and indeed general habitat loss throughout the species's range continues to decrease its survival prospects.

Bibliography. Abramson (1991, 1993a, 1993b), Allen (1993), Allen *et al.* (1990), Beissinger & Snyder (1992), Bertagnolio (1994), Clark (1991), Collar (1996), Collar & Andrew (1988), Collar, Crosby & Stattersfield (1994), Collar, Gonzaga *et al.* (1992), Descourtiz (1983), Dubs (1992), Forrester (1993), Grunebaum, D. & Grunebaum (1984), Grunebaum, W. (1984), Guedes & Harper (1995), Hayes (1995), Hohenstein (1987), Howe & Davis (1991), Inskipp *et al.* (1988), López (1992), Low (1972, 1991b, 1997g), Lowen *et al.* (1996), Lückner (1995b), Munn, da Silva *et al.* (1991), Munn, Thomsen & Yamashita (1987, 1989, 1990), Patzwahl (1997), Pittman (1993, 1996, 1997b), Porter (1997), Remsen & Traylor (1989), Reynolds (1993, 1997), Ridgely (1981, 1983, 1989), Roth (1989a), Schubart *et al.* (1965), Sick (1985, 1993), da Silva, C.P. *et al.* (1991), da Silva, J.M.C. & Willis (1986), Silva, T. (1991d), Smith, G.A. (1991c), Stotz *et al.* (1996), Tobias *et al.* (1993), Vieillard (1979), Volkemer (1984), Wege & Long (1995), Whitney (1996), Yamashita & Valle (1993).

186. Indigo Macaw

Anodorhynchus leari

French: Ara de Lear **German:** Learara **Spanish:** Guacamayo de Lear
Other common names: Lear's Macaw

Taxonomy. *Anodorhynchus leari* Bonaparte, 1856, no locality, presumed to have come from Brazil. May form a superspecies with *A. glaucus*. Monotypic.

Distribution. Interior NE Brazil.

Descriptive notes. 75 cm; 940 g. Metallic blue throughout, slightly tinged green, richer on wings, slightly fuscous on breast; bare orbital ring and semi-circular patch at base of lower mandible yellow.

Habitat. *Caatinga* thornscrub vegetation with stands of licuri palm (*Syagrus coronata*) and pastures, plus the proximity of sandstone cliffs for nesting and roosting.

Food and Feeding. Predominantly licuri palm nuts; also fruits of *Jatropha pohliana*, *Spondias tuberosa*, *Dioclea*, flowers of *Agave*, seeds of *Melanoxylon*; maize also taken when ripening.

Breeding. Oct-Jan. Nest in fissure in cliff. Clutch size unknown but 2 offspring repeatedly recorded fledging from nests; incubation in captivity lasts 28 days or more.

Movements. Apparently sedentary, with birds tied year-round to lands reachable from their accustomed nesting and roosting cliffs.

Status and Conservation. **CRITICALLY ENDANGERED.** CITES I. A BirdLife "restricted-range" species. Although known since mid-19th century from traded birds, wild population only discovered in 1978 when judged to consist of 60 birds, not all mature. Several new smaller populations have now been discovered, and in Jul 1994 altogether 118 birds were counted and the total popula-



tion was estimated at 140 birds. The species may always have been rare, hanging on as a relict, but the activities of man for possibly several hundred years have doubtless affected it adversely: clearance and non-regeneration of licuri palm stands as a consequence of stock-raising is probably the greatest and most enduring problem, since the original area covered by this palm was 250,000 km², while today the range of the macaw is confined to roughly 4000 km². Hunting for food was evidently also serious in the past. Trapping for trade, although illegal, is an ever-present danger: at least 19 birds probably stolen from the wild population

in 1996, a level of predation that would clearly obliterate the tiny wild population within under ten years; newly discovered populations are scattered in a remote area that appears difficult to police effectively. There are various initiatives to secure the management of local farmland and to warden colonies to minimize risks of disturbance and trapping. Part of the population occurs in the Raso da Catarina Ecological Station, but this is not in itself a guarantee of security.

Bibliography. Beissinger & Snyder (1992), Bish (1985), Brandt & Machado (1990), Cavalcanti (1988), Clinton-Eitnien (1981b), Collar (1996), Collar & Andrew (1988), Collar, Crosby & Stattersfield (1994), Collar, Gonzaga *et al.* (1992), Decoteau (1982), Forrester (1993), Freud (1980a), Harrison & Holyoak (1970), Hart (1992, 1995), King (1978/79), Low (1972, 1994b, 1997g), Munn (1995b), Reynolds (1993, 1995, 1997), Ridgely (1981), Seitre (1990), Shuker (1993), Sick (1979a, 1979b, 1981a, 1985, 1993), Sick & Teixeira (1980, 1983), Sick, Gonzaga & Teixeira (1987), Sick, Teixeira & Gonzaga (1979), Snow (1985), Stotz *et al.* (1996), Vieillard (1979), Voous (1965), Wege & Long (1995), Whitney (1996), Yamashita (1987), Yamashita & Valle (1993).

187. Glaucous Macaw

Anodorhynchus glaucus

French: Ara glauque **German:** Türkisara **Spanish:** Guacamayo Glauco

Taxonomy. *Macrocerus glaucus* Vieillot, 1816. South America between lat. 27° and 30° S...on the banks of the Paraná and Uruguay Rivers.

May form a superspecies with *A. leari*. Monotypic.

Distribution. E Paraguay, SE Brazil, W Uruguay and N Argentina.



Descriptive notes. 72 cm. Dull greenish blue; head and neck suffused greyish; bare orbital ring and semi-circular patch at base of lower mandible yellow; underside of tail grey. Immature undescribed.

Habitat. Lightly wooded grassland, marshes and river borders with good stands of palms and in particular yatay or chatay (*Butia yatay*).

Food and Feeding. Palm nuts, almost certainly predominantly those of *Butia yatay*.

Breeding. Dec-Jan. Nest in hole in cliff, e.g. in riverbank, but also in tree. Eggs reportedly two.

Movements. No certain information; the species was described as sedentary by one observer in the early nineteenth century, but a coastal island site in Santa Catarina, reported only once, is so anomalous that it may have been a seasonally visited area.

Status and Conservation. Almost certainly **EXTINCT.** CITES I. There have been only two moderately acceptable reports in the wild this century, and rumours of surviving populations and birds in private collections have either been disproved or remain unsubstantiated; possible sighting reported from Paraguay, 1997. The similarity of the species to *A. leari* has made it possible to work out the most probable food (yatay palm) within its known range: this palm, being an indicator of good soils, was a prime target for clearance by early colonists, and great areas of palm stand either were cut down or failed to regenerate owing to cattle-grazing. Other habitat destruction may also have been important, e.g. widespread loss of gallery forests. Substantial use of the species for food must have been greatly facilitated by its colonial cliff-nesting habit.

Bibliography. Beissinger & Snyder (1992), Belton (1984), Canevari *et al.* (1991), Chebez (1986a, 1994), Collar (1996), Collar & Andrew (1988), Collar, Crosby & Stattersfield (1994), Collar, Gonzaga *et al.* (1992), Decoteau (1982), Hayes (1995), King (1978/79), Low (1972, 1994b), Nores & Yzurieta (1994), Orfila (1936), Ridgely (1981), Shuker (1993), Sick (1969, 1985, 1993), Sick & Teixeira (1979), Smith, G.A. (1991b), Snow (1985), Stotz *et al.* (1996), Straube (1988), Vieillard (1979), Yamashita & Valle (1993), Zotta (1944).

Genus *CYANOPSITTA* Bonaparte, 1854

188. Spix's Macaw

Cyanopsitta spixii

French: Ara de Spix **German:** Spixara **Spanish:** Guacamayo de Spix
Other common names: Little Blue Macaw

Taxonomy. *Sittace Spixii* Wagler, 1832, Joazeiro, Rio São Francisco, Brazil.

Occasionally placed in *Ara*. Monotypic.

Distribution. N Bahia (E Brazil).

Descriptive notes. 55-57 cm; 296-400 g (captivity). Crown pale greenish blue; bare mask-like area around eye to upper mandible blackish grey; cheeks to ear-coverts light grey, shading to blue of rest



Nest in hole in caraiba and, by report, braúna. Eggs probably 2-3, although in captivity 4 laid; again in captivity, incubation 26 days, and nestling period two months, with a dependence period of 3 months after that.

Movements. Reports of the species from other habitats and areas are mostly likely to be misidentifications, but some nomadism may have occurred in cases where nesting habitat was cleared and birds, unlimited by food availability, wandered in search of alternative areas to breed in. Moreover, some wandering in response to rainfall appears to have taken place, with (e.g.) birds absent from their known breeding area from Dec 1986 to Mar 1987, reappearing when rains began. The single surviving wild bird sometimes disappears for days or even weeks from its favoured area.

Status and Conservation. CRITICALLY ENDANGERED. CITES I. A BirdLife "restricted-range" species. Although known to science since 1824 and fully protected by Brazilian law since 1967, the species was only rediscovered in the wild in 1985, when just five birds, including two pairs, were located at Melância Creek near Curaçá, N Bahia. Trappers had been active at the site for some 15 years, removing at least 23 birds and possibly as many as 40, and by 1988 appeared to have removed the last five. However, one wild survivor was located in 1990, when it was realized that while trapping was the proximate cause of the species's rarity, the ultimate cause was the almost total loss of caraiba woodland, its nesting habitat, of which only 30 km² appeared to remain. The Brazilian nature conservation authority, IBAMA, established a Permanent Committee for the Recovery of Spix's Macaw in 1990, and this has involved various interested parties including most holders of captive birds, plus representatives of certain international nature conservation bodies. Attempts have been made to improve captive breeding performance by moving birds between facilities, and there has been a steady growth in the number of captive birds to over 30, although most (and probably all) are very closely related to one another. In 1995, after tests on feathers to confirm the sex (male) of the wild bird, a captive wild-caught female was released to join it. However, the wild bird had paired with a solitary *Propyrrhura maracana*, and although the released female met up with the male they did not form a bond, possibly because of the *Propyrrhura*, and in due course the female disappeared. In mid-1996 the male was still alive.

Bibliography. Anon. (1995c, 1995f, 1995h), Arndt *et al.* (1986), Beissinger & Snyder (1992), Brack (1987), Cavalcanti (1988), Collar (1996), Collar & Andrew (1988), Collar, Crosby & Stattersfield (1994), Collar, Gonzaga *et al.* (1992), Decoteau (1982), Forrester (1993), Griffiths & Tiwari (1995), Hämmerli (1991), Harrison & Holyoak (1970), Juniper (1990a, 1990b, 1991, 1997), Juniper & Yamashita (1990, 1991), Keller (1987, 1992), King (1978/79), Low (1972, 1994b, 1997g), Margolis (1996), da Ré (1995), Reynolds (1993), Ridgely (1981), Roth (1985, 1986, 1987a, 1987b, 1988a, 1988b, 1989b, 1990), Sick (1969, 1985, 1993), Silva (1990, 1991a, 1994a, 1994c), Smith, G.A. (1991a), Snow (1985), Sojer (1989), Sojer & Wirth (1989), Stotz *et al.* (1996), Sweeney (1994d, 1995c, 1996d), Thomsen & Munn (1988), Vaughan (1993), Waugh (1996a, 1996b), Wege & Long (1995), Whitney (1996).

Genus *ARA* Lacépède, 1799

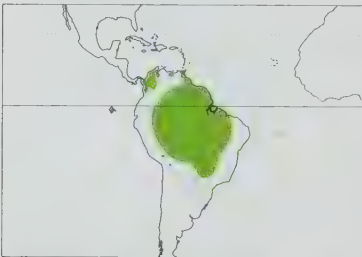
189. Blue-and-yellow Macaw

Ara ararauna

French: Ara bleu **German:** Ararauna **Spanish:** Guacamayo Azulamarillo
Other common names: Blue-and-gold Macaw

Taxonomy. *Psittacus Ararauna*, Linnaeus, 1758, South America = Pernambuco. Monotypic.

Distribution. E Panama through Colombia E to S Venezuela, the Guianas and Brazil, and S to W & E Ecuador, E Peru and NE Bolivia; formerly occurred on Trinidad, and apparently also in Paraguay and N Argentina. Also listed for W Ecuador, where probably extinct.



Descriptive notes. 86 cm; 995-1380 g. Forehead to mid-crown dull green shading into blue on rest of upperparts, wings and tail; bare face white with thin dark feathered transverse lines, the lowest of which loops down and broadens as blackish green chinstrap; ear-coverts, sides of neck and rest of underparts strong yellow except vent pale blue; underside of tail gold edged dusky; underwing-coverts yellow. Immature similar.

Habitat. Seasonally flooded *várzea* forest and gallery forest, *Mauritia* palm stands in savanna, and, in NW of range, deciduous forest away from water; lowlands to only 500 m in

most of range, occasionally to 1500 m in Peru.

Food and Feeding. Seeds of *Spondias*, *Terminalia*, *Hura*, *Enterolobium*, *Inga*, *Parkia*, *Platypodium*, nectar of *Quararibea*, flowers of *Combretum*, fruit and/or petioles of *Ficus*, pulp of *Sloanea*, *Schwartzia*, *Brosimum*, *Soroea*, aril of *Otoba*, leaves of *Iriarte*, mesocarp of *Scheelea* and *Pouteria*, and undetermined parts of *Mauritia*; *Maximiliana* palm nuts in Surinam.

Breeding. Evidence of breeding Dec-Feb in Colombia, Jan-Mar in Surinam, and Apr-May on Trinidad; in Guyana, eggs laid around Feb, cycle lasting to Jun; in Peru eggs laid Nov-Jan, cycle completed generally by Apr. Nest in hole high in dead *Mauritia* or other palm. Eggs 1-3. In one study, of 17 nestlings recorded in 14 nests, 10 (59%) fledged, 3 (18%) died of malnutrition or related diseases, and 4 (24%) were killed by predators.

of plumage, slightly glaucous on belly and vent; wings and tail darker blue. Immature has bare facial area whitish grey, plumage darker blue.

Habitat. Gallery woodland dominated by caraiba (*Tabebuia caraiba*) trees within the *caatinga* dry scrub zone, dominated locally by the euphorbs *Jatropha* and *Cnidocolus* along with *Caesalpinia*, *Ziziphus* and various cacti such as *Cereus*, *Pilocereus* and *Opuntia*.

Food and Feeding. Seeds of *Jatropha* and *Cnidocolus*, fruits of *Ziziphus* and *Maytenus*, fruits and/or seeds of braúna (*Melanoxylon*).

Breeding. Nov-Mar, variable with rainfall.

Movements. Seasonal foraging may take birds into semi-open country (in Colombia this typically happens in wet season), and such movements appear to be responsible for records of the species from Paraguay.

Status and Conservation. Not globally threatened. CITES II. Common still in much of range, with a density of 1 pair/km² in Manu National Park, Peru. However, less numerous at edges of range, and declining with habitat loss in many of these peripheral areas; thus extinct on Azuero Peninsula, Panama, and probably extinct in W Andes, Ecuador, and at great risk in W Andes, Colombia; however, still common in Los Katíos National Park in NW Colombia in 1989. Around 1980 only around 10 birds remained in the Nariva Swamp, Trinidad, and these are now gone, in large part owing to the taking of young from nests. In SE Brazil the species became extinct by 1960's except for relict population in Morro do Diabo State Forest, São Paulo, and in SW Brazil there is evidence for substantial local decrease in numbers, for reasons unclear. Many thousands exported annually, chiefly from Bolivia and Guyana, in late 1970's, and although still common in former in early 1980's there were strong fears for its long-term survival there. Bolivia exported 18,350 in the four years 1981-1984 after which trade was banned, but Guyana continued to export over 2000 birds annually, 1985-1990, prohibiting further trade in 1993. Areas depleted by intensive trapping may recover numbers fairly rapidly, but local extinction in Orinoco Delta within 10 years predicted from relentless removal of young from nests, and hunting pressure has caused a considerable decrease in French Guiana, where only a few hundred were believed to survive in the 1980's; in Surinam it is still a gamebird with open season 15 Jul-31 Dec, and as a consequence now lost from Surinam R basin. In E Peru, where suitable nest-sites appear to limit the population, nesting habitat has successfully been created by decapitating *Mauritia* palms.

Bibliography. Abramson (1993b), Anon. (1993), Canevari *et al.* (1991), Delgado (1985a), Desenne & Strahl (1991, 1994), Dugand (1947), French (1985, 1991), Hanák (1980), Haverschmidt (1954), Haverschmidt & Mees (1994), Hayes (1995), Hilty (1985), Hilty & Brown (1986), Inskipp *et al.* (1988), López (1992), Low (1972, 1997g), McLoughlin & Burton (1970), Meyer de Schauensee & Phelps (1978), Munn (1988), Nycander *et al.* (1995), O'Neill (1981), Pérez-Rivera (1996), Pulido (1991), Ridgely (1981), Ridgely & Gwynne (1989), Risdon (1965), do Rosário (1996), Schallenger (1997), Short (1975), Sick (1985, 1993), Snyder (1966), Stotz *et al.* (1996), Terborgh, Fitzpatrick & Emmons (1984), Terborgh, Robinson *et al.* (1990), Thiollay (1988), Tostain *et al.* (1992), Wetmore (1968), Whitney (1996), Willis & Oniki (1981).

190. Blue-throated Macaw

Ara glaucogularis

French: Ara canindé **German:** Blaukehrlara **Spanish:** Guacamayo Barbazul
Other common names: Caninde/Wagler's Macaw

Taxonomy. *Ara glaucogularis* Dabbene, 1921, Santa Cruz de la Sierra, Department of Santa Cruz, Bolivia.

Taxonomic status long disputed, largely because species was unknown in wild to ornithologists until very recently; was considered probably an aberrant form of *A. ararauna*, but the two are now known to occur sympatrically without interbreeding. In past, present species has erroneously been named *A. canindé*, but this name is probably a synonym of *A. ararauna*. Monotypic.

Distribution. N Bolivia.



Descriptive notes. 85 cm; 600-800 g. Very similar to *A. ararauna*, but lighter and thinner tailed, crown all blue, and bare facial patch (pinkish around base of bill) almost totally obscured by thick blue feather lines merging into blue lower cheek, chin and throat. Immature has darker blue on throat.

Habitat. Seasonally inundated savanna with groves of *Attalea phalerata* and *A. princeps* palms, scattered *Acrocomia* and *Copernicia* palms, and small slightly raised patches of low tropical forest dominated by *Scheelea* and *Acrocomia* palms and large *Tabebuia impetiginosa* trees. Occurs in lowlands at 200-

300 m, on occasion near human habitation.

Food and Feeding. Mesocarp of fruits of *Attalea* and *Acrocomia* palms, occasionally opening unripe *Attalea* nuts to drink liquid within.

Breeding. Oct/Nov-Mar. Nest in hole in *Acrocomia* or *Attalea* palm or tall *Tabebuia*; in Nov 1996, nest found in live deciduous tree, probably *Calycophyllum*. In captivity: 2-3 eggs; incubation 26-28 days; nestling period 90-94 days.

Movements. No information.

Status and Conservation. ENDANGERED. CITES I. A BirdLife "restricted-range" species. This bird has always been very rare and until 1992 was known by skins from uncertain localities and captive specimens. Although 28 birds were discovered in 1992, the possible total in three areas of N Bolivia may be only 100 individuals, well short of the 500-1000 suggested in early 1980's. Seen in flocks of up to 5 birds, never in large ones like some macaw species; in occupied areas, outnumbered by *A. ararauna* by factor of 20, and may suffer competition from this larger congener. The principal danger at present is from trapping for trade, e.g. 6 wild-bred birds stolen from Santa Cruz Zoo in Dec 1996; 390 birds recorded in international trade in period 1981-1992, most in 1981-1984; CITES I since 1983, and additional Bolivian legislature in 1984 and 1986. Also significant is agriculture, as all populations located to date are on ranchland: burning to improve pasture destroys potential nesting trees and may reduce food supplies; cattle too cause serious damage to vegetation. Current conservation initiatives include discussions with local ranchers and also with schoolchildren in order to enlist local support to save the species; requirements include more exhaustive census work and also research into biology and ecology.

Bibliography. Abramson (1993b), Anon. (1997a), Beissinger & Snyder (1992), Brack *et al.* (1995), Canevari *et al.* (1991), Chebez (1987a), Collar (1996), Collar & Andrew (1988), Collar, Crosby & Stattersfield (1994), Collar, Gonzaga *et al.* (1992), Duffield & Hesse (1997), Freud (1993c), de Grahl (1985), Hayes (1995), Hayward (1983), Hesse (1993, 1997), Ingels *et al.* (1981), Jordan & Munn (1993), Kiessling (1985), King (1978/79), Lanning (1982), Leibfarth (1988), Low (1972, 1994b), Morvan *et al.* (1993, 1995), Munn & Munn (1993), Nores & Yzurieta (1984, 1994), Remsen & Traylor (1989), Remsen *et al.* (1986), Ridgely (1981), Riviere *et al.* (1986), Stotz *et al.* (1996), Sweeney (1994b, 1996c, 1997c), Waugh (1996b), Wege & Long (1995), Whitney (1996).

191. Military Macaw

Ara militaris

French: Ara militaire **German:** Soldatenara **Spanish:** Guacamayo Militar

Taxonomy. *Psittacus militaris* Linnaeus, 1766, no locality, Colombia suggested. Sometimes treated as conspecific with *A. ambiguus*, but in spite of evidence of interbreeding the characters of the two forms are consistently different over their respective ranges. Three subspecies recognized.

Subspecies and Distribution.

A. m. mexicana Ridgway, 1915 - Mexico.

A. m. militaris (Linnaeus, 1766) - NW Venezuela, Colombia, E Ecuador and N Peru.

A. m. boliviana Reichenow, 1908 - Bolivia and N Argentina.



Descriptive notes. 70-71 cm; 972-1134 g. Forehead red; bare patch on face extending over eye white (often flushing pinkish-red) with dark transverse feather lines; rest of crown, nape and body green, except olive-yellow on throat and pale blue on lower back, rump and tail-coverts; wings with olive tone, flight-feathers mostly blue above, olive-yellow below; tail blue above, with red at base, olive-yellow below. Immature similar. Race *mexicana* slightly larger; *boliviana* has indistinct brown throat patch, spreading onto upper breast.

Habitat. Relatively dry montane evergreen and tropical deciduous forest, gallery woodland and

pine-oak formations, 600-2600 m, seasonally in some places penetrating humid forest, thorn forest and other habitats in lowland areas. Local presence dictated by preference for roost- and nest-sites in cliffs.

Food and Feeding. *Jessenia bataua* palm, *Melia azedarach* fruit, *Ficus*.

Breeding. Reportedly from Mar in Mexico, but other evidence indicates as late as Jun-Jul. No information elsewhere in range. Nest in hole in tree. In Mexico even holes fashioned by the near-extinct or extinct Imperial Woodpecker (*Campephilus imperialis*); also in cliffs, and formerly on rocky inshore islets off Acapulco. Eggs 2-3.

Movements. In Colombia regularly crosses E Andes from Huila to Caquetá, and then present in Cueva de los Guácharos National Park, May-Aug. In Peru birds (used to) cross from E slopes to an area of forest on W. Sept-Oct, to feed on particular fruits, thereby crossing large stretches of *puna* grassland. Birds also extend down into lower-lying habitats at certain seasons, e.g. dense thorn forest in dry season, Nov-Jun, W Mexico.

Status and Conservation. **VULNERABLE.** CITES I. In Mexico, uncommon to frequent in N part range, but possibly extinct in S, largely through trade. Reintroduction being attempted, Guatemala. Highly threatened in restricted Venezuelan range by combination of habitat loss and trade pressure; small populations are resident in Henri Pittier and Guatopo National Parks. Fairly common on N slope of Santa Marta massif but sporadic elsewhere, Colombia. Very few recent records, Ecuador. Uncommon and becoming rarer, N Peru, but as many as 50-60 birds seen per day in the Salvación and Atalaya areas of Manu National Park, 1994. Up to 60 recorded recently near Amboví National Park, Bolivia, but in Argentina the species is now extremely rare and on the verge of extinction.

Bibliography. Abramson (1993b), Binford (1989), Canevari *et al.* (1991), Chebez (1991), Collar (1996), Collar *et al.* (1994), Davies *et al.* (1994, 1997), Davis (1986), Desenne & Strahl (1991, 1994), Fernández-Badillo *et al.* (1994), Fjeldså & Krabbe (1990), Fjeldså *et al.* (1987), Gardner (1972), Haffer (1975), Hilty & Brown (1986), Howell & Webb (1995a), Inskipp *et al.* (1988), Low (1972, 1994b, 1997g), Machado de Barros (1995), Meyer de Schauensee & Phelps (1978), Munn (1988), Nore & Yzurieta (1994), O'Neill (1981), Parker *et al.* (1982), Pulido (1991), Ridgely (1981), Rowley (1984), Schaldach (1963), Stotz *et al.* (1996), Vansteenkiste (1997), Whitney (1996), Wille (1992), Zimmer (1930).

192. Great Green Macaw

Ara ambiguus

French: Ara de Buffon

German: Bechsteinara

Spanish: Guacamayo Ambiguo

Other common names: Buffon's Macaw

Taxonomy. *Psittacus ambiguus* Bechstein, 1811, north-western Colombia.

Sometimes treated as conspecific with *A. militaris*, but in spite of evidence of interbreeding the characters of the two forms are consistently different over their respective ranges. Two subspecies recognized.

Distribution.

A. a. ambiguus (Bechstein, 1811) - E Honduras and Nicaragua through Costa Rica and Panama to NW Colombia.

A. a. guayaquilensis Chapman, 1925 - W Ecuador.



Descriptive notes. 85-90 cm; 1265-1430 g. Very similar to *A. militaris* but larger with larger bill, notably paler (lime) green on head and upper wing-coverts, paler blue on lower back to uppertail-coverts, and tail longer and with more orange-red; in old birds, especially females, the black lines of the face turn red, a tendency not noted in *A. militaris*. Immature duller, more olive. Race *guayaquilensis* has a smaller bill.

Habitat. Humid lowland evergreen forest and intervening tracts of partially cleared terrain, up to 1000 m; in Colombia in wetter areas than *A. militaris*, but in Ecuador the species also

extends into deciduous forest.

Food and Feeding. Seeds of *Dipteryx panamensis* are highly important during the breeding season, but other seeds and fruit are taken, including the very hard-shelled *Lecythis costaricensis*.

Breeding. Dec-Apr or later in Costa Rica; May-Oct in Ecuador. Nest is hole in tree, in one case a dead *Cavanillesia platanifolia* in Ecuador, but large *Dipteryx panamensis* apparently preferred in Costa Rica. Lays 2-3 eggs, captive birds rarely 4; in captivity, incubation by female only around 29 days, nestling period about 11 weeks.

Movements. Very poorly understood, but in Costa Rica birds range widely over Caribbean slope, perhaps tracking fruiting *Dipteryx*; concentrations appear on the coast, Oct-Dec, then are thought to move inland to breed, thereafter dispersing to other parts of the coastlands.

Status and Conservation. **VULNERABLE.** CITES I. Retreating in response to habitat loss throughout its range, and sensitive to habitat disturbance; perhaps NW Nicaragua and Colombia's Baudó Mountain foothills alone hold tracts of sufficiently extensive primary forest for its long-term sur-

vival. In Honduras its stronghold is the Río Plátano Biosphere Reserve, and in Panama it is fairly common in the Darién Biosphere Reserve. In Costa Rica the technology has been developed to process the super-hard timber of *Dipteryx* trees, so the species is now in crisis there. Numbers in Central America are much lower than the total of 5000 estimated for *Ara macao*, so situation clearly very serious. In N Ecuador (subspecies uncertain) the total population, located in and around Cotacachi-Cayapas Ecological Reserve, may only be 50-100 birds. Race *guayaquilensis* long considered threatened and now critically so, but with efforts being made to protect it in the 20 km² Cerro Blanco Forest Reserve in Guayas; there are also records from Machalilla National Park.

Bibliography. Abramson (1993b), van den Berg & Bosman (1984), Berg & Horstman (1996), Bjork & Powell (1995), Carriker (1910), Collar (1996), Collar *et al.* (1994), Fjeldså *et al.* (1987), Gale (1983), Haffer (1975), Hilty & Brown (1986), Horstman (1995, 1996), King (1978/79), Low (1972, 1994b, 1995b, 1997g), Meyer de Schauensee (1949), Monroe (1968), Müller (1997), Pfeffer (1997), Ridgely (1981), Ridgely & Gwynne (1989), Slud (1964), Stiles & Skutch (1989), Stotz *et al.* (1996), Thorn (1991), Waugh (1995), Wetmore (1968), Whitney (1996).

193. Scarlet Macaw

Ara macao

French: Ara rouge

German: Arakanga

Spanish: Guacamayo Macao

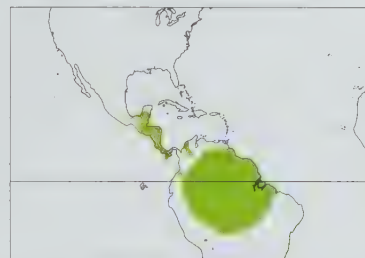
Taxonomy. *Psittacus Macao* Linnaeus, 1758, South America.

Two subspecies recognized.

Subspecies and Distribution.

A. m. cyanoptera Wiedenfeld, 1995 - SE Mexico to Nicaragua.

A. m. macao (Linnaeus, 1758) - Costa Rica, Panama and N & E Colombia (recent record from Nariño), E through Venezuela and the Guianas to C Brazil, and S to E Ecuador, E Peru and NE Bolivia.



Descriptive notes. 84-89 cm; 900-1490 g. Head and most of body red; large bare facial area extending round eye white; bill whitish above, blackish below; greater and median wing-coverts yellow edged with green; flight-feathers mainly blue; underwing mostly red; back, rump and tail-coverts pale blue; tail red tipped blue. Immature has shorter tail. Race *cyanoptera* larger, with yellow wing-coverts tipped blue.

Habitat. Largely in humid *terra firme* lowland evergreen forest and gallery woodland in savannas, often in vicinity of exposed river banks and clearings with big trees, and some-

times entering drier formations; tends to be confined to riverine forest in Guianas and more open deciduous or pine forest in Central America, sometimes roosting in mangroves; up to around 500 m, ranging at least formerly up to 1000 m in Central America.

Food and Feeding. Seeds of *Jacaranda*, *Dialium*, *Sclerolobium*, *Hymenaea*, *Caryocar*, *Licaria*, *Hevea*, *Guarea*, *Piptadenia*, *Porouma*, *Euterpe*, *Cedrela*, *Hura*, *Terminalia*, *Eschweilera*, *Sapum*, flowers/nectar of *Virola*, *Erythrina*, *Ochroma*, *Quararibea*, *Combretum*, leaves of *Laetia*, *Aspidosperma*, *Licania*, *Schizolobium*; pulp/ fruit of *Inga*, *Micropholis*, *Sterculia*, *Bursera*, *Ficus*, *Scheelea*, *Spondias*, *Dipteryx*, *Borismene*, *Anomospermum*, *Sorocea*, *Pseudolmedia*, *Ampelocera*, fruits and/or seeds of *Anacardium*, *Bernoullia*, *Brosimum*, *Enterolobium*, *Pithecellobium*, *Bytneria*, *Leonia*, *Couma* and *Goupia*; fruit, seeds, bark and leaves of *Ceiba*; fruit, seeds and flowers of *Tabeuia*, arils of *Virola* and *Cupania*, sap of *Clarisia*; in Brazil *Bertholletia*, *Lecythis* and *Syagrus* fruit appear to be favoured. In Central America birds noted to eat *Pinus caribaea* seeds, crushing the cones and dropping a shower of scales.

Breeding. Mar in Mexico; Apr in Nicaragua; Oct-Apr in Costa Rica, with flying young noted as early as Feb on Coiba I, Panama; evidence for Mar in French Guiana; Oct-Mar in C Brazil; Nov-Apr in Peru. Nest in large natural cavity 7-40 m up in tall tree, commonly in *Iriarthea* palms in Peru, where competition with *A. chloroptera* prevents use of *Dipteryx* and other hardwoods; in Costa Rica *Schizolobium* and *Ceiba* preferred. Eggs 1-4; incubation 24-28 days; nestling period 14 weeks. In one study, 9 out of 14 nests successfully produced one or more young; of the 21 nestlings involved, 10 (48%) fledged, 4 (19%) died of apparent malnutrition, and 7 (33%) were predated. In Costa Rica recruitment rates, 1990-1992, varied from 6.2% to 10.2%.

Movements. Seasonal movements in search of fruit occur, but pattern not determined other than that in Colombia in "summer" it penetrates semi-arid forest, and that it was a winter visitor in very large numbers, now all gone, to Pacific swamp and tropical deciduous forest in Oaxaca, Mexico.

Status and Conservation. Not globally threatened. CITES I. Common over much of extensive range where habitat remote from human disturbance, with a density of 1 pair/km² in Manu National Park, Peru. However, in Central America (where once revered as an oracle of the sun) the race *cyanoptera* only now survives in the Lacandon Forest, Mexico; it is now mainly confined to one area in Belize; it is extinct in most of Guatemala save the Petén; it is extinct in El Salvador; it is extinct or virtually so on the Pacific slope of Honduras and Nicaragua, although a relict population survives on the Cosigüina Peninsula in the latter; while on the Caribbean side 1000-1500 birds may survive in Honduras centred on Depto. Gracias A Dios (a good number are protected within Río Plátano Biosphere Reserve), and a population persists in eastern Nicaragua; altogether the total number of this subspecies is estimated at c. 4000. Habitat destruction and considerable trapping pressure, including for household pets locally, are responsible for this situation. The nominate race has also suffered substantial declines in settled and developing areas, and relict populations survive in Costa Rica, the best protected being in Corcovado National Park, and in Panama the stronghold is now Isla Coiba owing to its status as a penal settlement, birds at the only other site (Azuerro Peninsula) suffering from habitat loss and persecution by Indians using their feathers; the total Central American population of nominate birds may be only c. 1000. In French Guiana the species is less common than *A. chloroptera*, with most in coastal forests. Conservation initiative in Carara Biological Reserve, Costa Rica, involves education programmes for local communities, visitors and guards, community development with ecotourism promotion, and ongoing intensive biological study. Provision of nestboxes made from *Iriarthea* palm stems has been highly successful in improving reproductive output of the species in Peru, where the main constraint appears to be nest-site availability.

Bibliography. Abramson (1993b), Binford (1989), Bradshaw *et al.* (1995), Clinton-Eitner (1981a, 1991), Desenne (1994), Desenne & Strahl (1991, 1994), Fragosó (1985), González-García (1993), Greiser (1995), Haverschmidt & Mees (1994), Hebert (1992), Hilty & Brown (1986), Howell & Webb (1995a), Low (1972, 1997g), Lowery & Dalquest (1951), Marineros & Vaughan (1995), McLoughlin & Burton (1970), Meyer de Schauensee & Phelps (1978), Monroe (1968), Müller-Bierl (1986), Munn (1988), Nycander *et al.* (1995),

O'Neill (1981), Pulido (1991), Ridgely (1981), Ridgely & Gwynne (1989), Sick (1985, 1993), Slud (1964), Smith, G.A. (1991d), Snyder (1966), Stiles & Skutch (1989), Stotz *et al.* (1996), Terborgh *et al.* (1990), Thorn (1991), Tostain *et al.* (1992), Vaughan & Liske (1991), Vaughan *et al.* (1991), Volk & Volk (1983), Wetmore (1957, 1968), Whitney (1996), Wiedenfeld (1994).

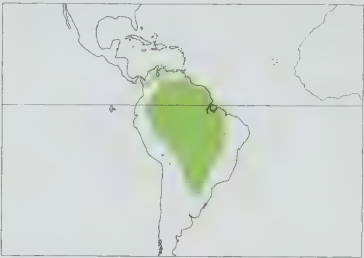
194. Red-and-green Macaw

Ara chloroptera

French: Ara chloroptère **German:** Grünflügelara **Spanish:** Guacamayo Aliverde
Other common names: Green-winged Macaw

Taxonomy. *Ara chloropterus* G. R. Gray, 1859, no locality. Original spelling has been taken as evidence that species name was created as a masculine noun; however, at least as likely to be a *lapsus calumi*, and long-standing feminine ending should thus be retained. Monotypic.

Distribution. E Panama through lowland Colombia, Venezuela, the Guianas and Brazil S to Paraguay and W to E Ecuador, E Peru and NE Bolivia; formerly in N Argentina.



Descriptive notes. 90-95 cm; 1050-1708 g. Very similar to *A. macao* but green in wing instead of yellow, red feathered lines on bare face, flight-feathers above mostly pale blue, and larger, with bill proportionately larger. Immature has shorter tail and replaces black on bill with grey.

Habitat. Humid lowland evergreen forest, generally up to 500 m, but also penetrating tropical deciduous forest and gallery woodland in savannas and llanos, and even undisturbed *caatinga* vegetation; favours hilly areas in Panama, where reaches to 1500 m.

Food and Feeding. Seeds of *Jacaranda*,

Tetragastris, *Sclerolobium*, *Hymenaea*, *Copaifera*, *Caryocar*, *Hevea*, *Eschweilera*, *Guarea*, *Abuta*, *Euterpe*, *Maximiliana*, *Micropholis*, *Sterculia*, *Spondias*, *Terminalia*, *Sapium*, *Croton*,

Parkia, pulp of *Inga*, *Quararibea*, *Rheedia*, *Eperua*, *Dipteryx*, *Schwartzia*, *Borismene*, *Sorocea*, *Mauritia*, fruits of *Endopleura*, *Bertholletia*, endosperm of *Scheelea*, arils of *Virola*, leaves of *Erythrina*.

Breeding. Nesting or prospecting in Dec, Surinam; Nov-Apr in Peru; evidence of nesting from Jan in C Brazil. Nest in hole in tree, in E Peru preferred species being *Dipteryx* or *Iriarthea*; in sandstone cliffs at two sites in Bolivia, in natural cavity high in cliff, NE Brazil, and birds observed digging in river cliffs in S Brazil. Eggs 2-3. In one study, 7 out of 16 nests successfully produced one or more young; of the 25 nestlings involved, 10 (40%) fledged, 9 (36%) died of apparent malnutrition, and 6 (24%) were predated.

Movements. No information. Birds are reportedly commoner in the dry season. Mato Grosso, and records in Argentina may always have been of wanderers.

Status and Conservation. Not globally threatened. CITES II. Generally uncommon, pairs frequently solitary and dispersed. Has declined at edges of range, and usually disappears early from areas disturbed or settled by man. Very uncommon, Panama, where at risk from trade. In steep decline, W Colombia. Heavily persecuted for trade, Venezuela, but little habitat loss as yet. Uncommon in Guyana, but most widespread macaw in Surinam and French Guiana, but greatly reduced in latter through uncontrolled hunting but still commoner there than *A. macao* (in contrast to pattern elsewhere). Under great pressure in E parts of C Brazil from both habitat loss and in particular taking of nestlings for trade, and now extinct in SE Brazil, where formerly common, except for remnant population in Morro do Diabolo State Forest, São Paulo. Apparently a steep decline in Ecuador in 1970's, but still fairly common, Peru, with a density of 1 pair/km² in Manu National Park. Common in *campos cerrados*, Paraguay, elsewhere uncommon to rare. Few records in Argentina since 1917, possibly escapes. Most of the average 1962 birds in international trade each year in 1981-1985 came from Bolivia and Guyana, and most went to USA; in 1986-1990 the figure fell slightly to 1706, with Guyana the chief source, but in 1993 the country introduced an indefinite prohibition on further exports.

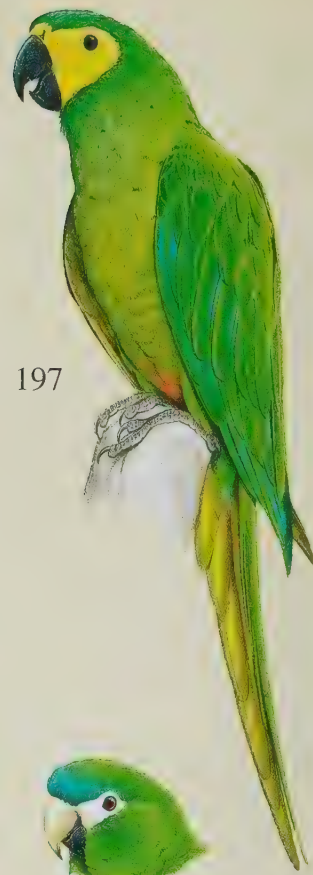
Bibliography. Abramson (1993b), Anon. (1993), Canevari *et al.* (1991), Chebez (1987b), Contreras *et al.* (1990), Deckert (1991), Deckert & Deckert (1982), Delorme (1979), Desenne (1994), Desenne & Strahl (1991, 1994), Haverschmidt & Mees (1994), Hayes (1995), Hilty (1985), Hilty & Brown (1986), Hohmann (1984), Inskipp *et al.* (1988), López (1992), Low (1972, 1997g), McLoughlin & Burton (1970), Meyer de Schauensee & Phelps (1978), Munn (1988), Nazimuddeen (1991), Nores & Yzurieta (1994), Nycander *et al.* (1995), O'Neill (1981), Olmos (1993), de la Peña (1988), Pinto (1946), Pulido (1991), Ridgely (1981), Ridgely & Gwynne (1989), Rigge (1963), Robbins *et al.* (1985), Short (1975), Sick (1985, 1993), Snyder (1966), Soos (1996), Stotz *et al.* (1996), Terborgh *et al.* (1990), Thiollay (1988), Tostain *et al.* (1992), Wetmore (1968), Whitney (1996), Willis & Oniki (1981).



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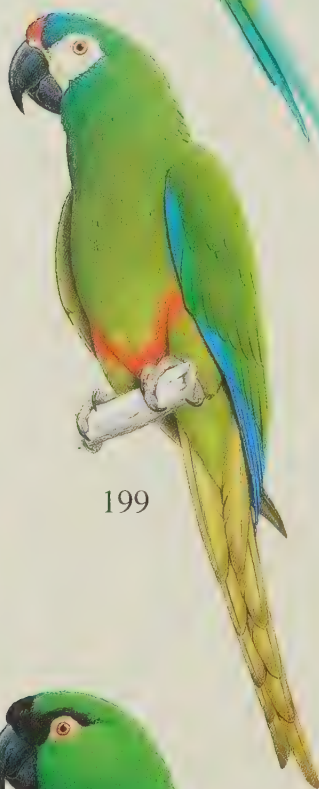
196



197



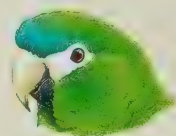
198



199



200



201

ssp cumanensis



ssp nobilis



202



203



204



205

195. Red-fronted Macaw

Ara rubrogenys

French: Ara de Lafresnaye German: Rotohara Spanish: Guacamayo de Cochabamba

Taxonomy. *Ara rubro-genys* Lafresnaye, 1847, Bolivia. Monotypic.

Distribution. C Bolivia.



Descriptive notes. 55-60 cm; 450-650 g. Broad red forehead running up and back to above eye; bare orbital ring and strip at base of bill pale pinkish red; rear ear-coverts, shoulder patch, underwing-coverts and thighs red; rest of body green except turquoise in flight-feathers and distal half of tail. Immature has reduced red throughout.

Habitat. Arid montane scrub, deciduous and cactus woodland in intermontane valleys and gorges at 1100-2500 m, common tree genera being *Prosopis*, *Carica*, *Acacia*, *Mimosa*, *Gourliea*, *Schinus*, *Schinopsis*, *Aspidosperma*, *Jacaranda*, *Erythrina*, *Salix*, *Alnus* and

Dodonea, with such cacti as *Cleistocactus*, *Lobivia*, *Echinopsis*, *Opuntia*, *Quiabentia* and *Cereus*.

Food and Feeding. The legumes *Schinopsis quebracho* and *Prosopis chilensis* and a cactus *Cereus* (or *Neocardenasia*) are important; so also are *Schinus*, *Aspidosperma*, *Cnidoscolus*, *Jatropha*, *Erythrina*, *Ziziphus* and the grasses *Tribulus* and *Cenchrus*; also cultivated crops of maize and groundnuts. These and other foods become available at various stages of the year, so each may have considerable value to the species.

Breeding. Oct-Mar, sometimes later, but apparently timed so that fledging coincides with period of maximum food availability, in Feb-Mar. Nest in fissure in cliff; often loosely colonial. Eggs 1-3; in captivity, incubation 26 days, nestling period 70-73 days.

Movements. No evidence of any displacements.

Status and Conservation. ENDANGERED. CITES I. A BirdLife "restricted-range" species. Although the subject of several recent studies, total population difficult to assess: figures of 1000-3000 and 3000-5000 have been put forward, yet only 555-626 were censused in the main range in 1991, so possibly less than 1000 survive. Several hundred birds were reputedly trapped annually up to 1987, although trade has not been flagged as a problem since. However, the birds' depredation of local crops results in some persecution by farmers, some of whom appear very recently to have acquired firearms for the purpose, and the steady clearance and degradation of woodland by charcoal-burners, firewood-gatherers and goats is rendering the long-term prospects for the species very doubtful.

Bibliography. Abramson (1993b), Beissinger & Snyder (1992), Boussekey *et al.* (1991a, 1991b, 1992), Brace *et al.* (1995), Christiansen & Pitter (1993a, 1993b), Clarke & Durán (1991), Collar (1996), Collar & Andrew (1988), Collar, Crosby & Stattersfield (1994), Collar, Gonzaga *et al.* (1992), DeLoach (1982, 1983), Fjeldså & Krabbe (1990), Freud (1993c), Krabbe *et al.* (1996), Lanning (1982, 1991a), Low (1972, 1994b, 1997g), Müller-Bierl & Cordier (1991), Norez & Yzurieta (1984), Pitter & Christiansen (1995), Remsen & Traylor (1989), Remsen *et al.* (1986), Ridgely (1981), Robiller *et al.* (1988a), Romero (1974a, 1974b), Simmons (1993), Stotz *et al.* (1996), Wege & Long (1995), Whitney (1996).

196. Chestnut-fronted Macaw

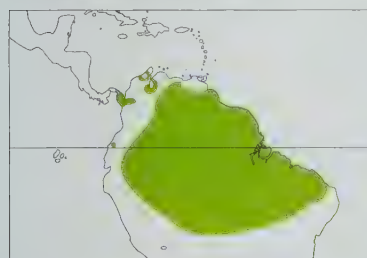
Ara severa

French: Ara vert German: Rotbugara Spanish: Guacamayo Severo
Other common names: Severe Macaw

Taxonomy. *Psittacus severus* Linnaeus, 1758, Indies; error = Amazon River.

Usually treated as comprising two races, with W populations (*castaneifrons*) being marginally larger, but differences likely to be clinal. Monotypic.

Distribution. E Panama and Colombia S and E through Ecuador, E Peru and N Bolivia to C & NE Brazil, Venezuela and the Guianas.



Descriptive notes. 46-51 cm; 285-387 g (other data suggest mean of 430 g). Narrow dark chestnut frontal band, rest of crown dull turquoise; bare facial patch extending over eye white, bordered below and under chin by narrow dark brown line; rest of body green but with red shoulder, carpal area and lesser underwing-coverts, blue primary coverts and primaries, turquoise vent and reddish tail with blue tip. Immature undescribed.

Habitat. Seasonally flooded (*várzea*) forest, early successional growth along rivers, gallery woodland, palm-rich borders of slow-moving rivers and swampy areas, second growth, old

plantations and clearings with scattered large trees, temporarily or permanently wet areas with

Mauritia palm stands; occasionally in humid lowland *terra firme* forest. Generally up to 600 m, but 1500 m recorded in Ecuador, perhaps as seasonal wanderer.

Food and Feeding. Seeds of *Sclerolobium albiflorum*, *Sapium aereum*, *Cedrela odorata*, *Cupania cinerea*, pulp of *Hyeronima* and *Ficus*, pulp and seeds of *Inga laterifolia*, *Micropholus melinoneana*, *Euterpe precatória*, *Citharexylum poeppigii* and *Gulielma*, fruit of *Hura crepitans*, *Feuillea*, *Cecropia* and *Cariniana*, leaves of *Cecropia miparia* and *Sterculia excelsa*, flowers of *Quararibea cordata*, *Virola surinamensis* and *Erythrina amazonica*, bark of *Ceiba pentandra*.

Breeding. Feb in Panama; Mar-May in Colombia and Surinam; Sept-Dec or later in SC Brazil. Prefers tall dead palms, in one case *Roystonea*, often over water. Eggs 2; in captivity, incubation 28 days, nestling period not more than 9 weeks.

Movements. No evidence other than the possible vertical movement noted above.

Status and Conservation. Not globally threatened. CITES II. No evidence of any substantial decline in overall numbers; indeed may increase range with patchy forest clearance creating longer edges. Fairly common in Darién, Panama, but illegal trade persistent in region. Extinct in Cauca valley, W Colombia, but elsewhere maintaining presence, and abundant at Los Katíos National Park in NW in 1989. Extensive clearance for open farmland in W Ecuador has caused a decline, but common to abundant in E Ecuador and Peru, with a density of 1 pair/km² in Manu National Park. Recently extended its range to become breeding resident in Henri Pittier National Park, but burning of deciduous forest in N Venezuelan range causing a local decline, and some pressure from local trade. Common in parts of Surinam, but relatively rare in French Guiana, and evidently at edge of range in Guyana, where rare. International trade not considered a problem: Bolivia exported 6417 in years 1981-1984 but then banned all psittacine commerce.

Bibliography. Desenne (1994), Desenne & Strahl (1991, 1994), Fernández-Badillo *et al.* (1994), Friedmann (1948b), Haverschmidt & Mees (1994), Hilty & Brown (1986), Inskipp *et al.* (1988), Low (1972, 1997g), McLoughlin & Burton (1970), Meyer de Schauensee & Phelps (1978), Mullick (1969), Munn (1988), O'Neill (1974, 1981), Pulido (1991), Ratcliffe (1984), Ridgely (1981), Ridgely & Gwynne (1989), Scharringa (1975), Sick (1985, 1993), Snyder (1966), Stotz *et al.* (1996), Terborgh *et al.* (1990), Tostain *et al.* (1992), Vit (1988), Wetmore (1968), Whitney (1996).

Genus *ORTHOPSITTACA* Ridgway, 1912

197. Red-bellied Macaw

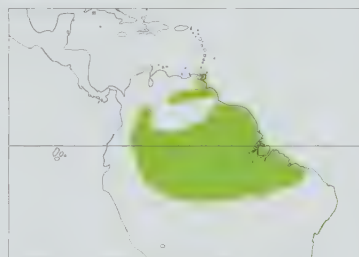
Orthopsittaca manilata

French: Ara macavouanne German: Rotbauchara Spanish: Guacamayo Ventrirrojo

Taxonomy. *Psittacus manilatus* Boddaert, 1783, Cayenne.

Normally included in genus *Ara* (see page 284). Monotypic.

Distribution. SE Colombia S to E Ecuador, E Peru and N Bolivia, and E through Venezuela, Trinidad and the Guianas to NC & NE Brazil.



Descriptive notes. 50-51 cm; 292-390 g. Bare facial patch from base of bill above and behind eye pale yellowish; forehead grey-blue shading through dull blue to green on nape and rest of plumage, but with brownish red patch on belly, bluish green undertail-coverts, primary coverts and primaries above blue, undersides of flight-feathers and tail olive-yellow. Immature undescribed.

Habitat. *Mauritia* palm stands in seasonally or permanently inundated savannas and partly forested lands and along creeks, gallery forest and tall mangroves, penetrating parklands and plantations near settlements. Up to 500 m.

Food and Feeding. Almost exclusively the fruits of *Mauritia* palms, but *Euterpe* and *Roystonea oleracea* also recorded.

Breeding. Feb-Jun in Guyana; Feb and Sept, Trinidad; bird visiting hole in stub in Sept, Brazil. Nest in hole in dead palm, of which base commonly in water, possibly giving protection against predation; on Trinidad often in just-vacated hole of *Amazona amazonica*. Eggs 2 (in captivity 4); also in captivity, incubation lasts 25 days, and nestling period 73-78 days.

Movements. At a site in Bolivia, Sept-Nov, the species was common but in another year it could not be found. Nov-Jan, suggesting either annual fluctuations in numbers or some migratory pattern, presumably in response to annual or seasonal differences in *Mauritia* phenology across its wide range.

Status and Conservation. Not globally threatened. CITES II. Generally common to abundant throughout range with the exception of Colombia and Guyana, where uncommon: *Mauritia* palm stands tend to be left by human colonists, so this bird is little affected by forest clearance within range, and it is relatively little sought-after for trade. However, in Venezuela there is some commercial exploitation and habitat loss, in French Guiana industrial use of palms is considered a potential threat to the species, while in Guyana around 1980 a proposed dam was expected to reduce its habitat substantially, combined with an annual average of 383 birds exported 1981-1985, was a source of concern for its future in the country.

Bibliography. Desenne & Strahl (1991, 1994), French (1991), Friedmann & Smith (1955), Haverschmidt & Mees (1994), Herklots (1961), Hilty & Brown (1986), Inskipp *et al.* (1988), Low (1972, 1987a, 1997g), McLoughlin & Burton (1970), Meyer de Schauensee & Phelps (1978), Niles (1981), O'Neill (1981), Parker & Remsen (1987), Pearson (1975a), Pinto (1964), Remsen & Ridgely (1980), Ridgely (1981), Roth (1984a), Sick (1985, 1993), Snyder (1966), Stotz *et al.* (1996), Tostain *et al.* (1992), Whitney (1996), Willis & Oniki (1993).

Genus *PROPYRRHURA* Miranda-Ribeiro, 1920

198. Blue-headed Macaw

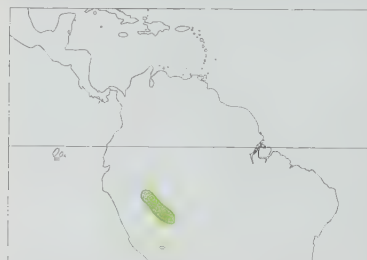
Propyrrhura couloni

French: Ara de Coulon German: Blaukopfara Spanish: Guacamayo Cabeciazul

Taxonomy. *Ara couloni* P. L. Slater, 1876, eastern Peru.

Normally placed in genus *Ara* (see page 284). Forms superspecies with *P. maracana* and *P. auricollis*; sometimes considered conspecific with former. Monotypic.

Distribution. E Peru and extreme W Brazil S to N Bolivia.



Descriptive notes. 41 cm; 207-294 g. Head blue; small bare facial patch from bill around eye greyish; body green; edge of wing, primary coverts and flight-feathers blue; tail above dull reddish shading at tip to blue; wings and tail below dusky yellow. Immature undescribed.

Habitat. Edge of humid lowland evergreen forest, along rivers and by clearings and other breaks in continuous canopy, locally even on the outskirts of towns; lowlands to 1550 m.

Food and Feeding. No information.

Breeding. Young birds observed in company of adults in Apr.

Movements. Occurrence in lowland SE Peru erratic.

Status and Conservation. Not globally threatened. CITES II. One of the least known of South American parrots. Although it is usually reported as uncommon to rare, it can be locally fairly common, especially around settlements; and owing to its habitat preferences, patchwork clearance of forest within its range may even cause an increase in overall population. Recent observations suggest it is commoner in foothills than the lowlands in Manu National Park; 4-6 birds per day seen in the Salvación and Atalaya area of the park, but reproductive output very low, with only one of ten pairs seen immediately after the breeding season judged to have bred successfully (accompanied by one young) in 1994. Virtually unknown in international trade.

Bibliography. Allen (1995), Low (1972, 1997g), Machado de Barros (1995), O'Neill (1981), Parker & Remsen (1987), Parker, Castillo *et al.* (1991), Parker, Parker & Plenge (1982), Pinto (1964), Pulido (1991), Ridgely (1981), Sick (1985, 1993), Stotz *et al.* (1996), Terborgh *et al.* (1984), Weske (1972), Wheatley (1994), Whitney (1996).

199. Blue-winged Macaw

Propyrrhura maracana

French: Ara d'Illiger

German: Maracana

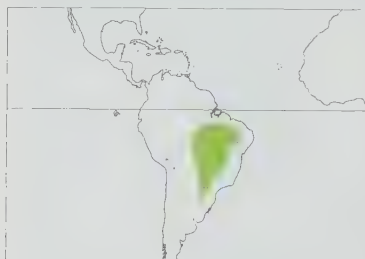
Spanish: Guacamayo Maracaná

Other common names: Illiger's Macaw

Taxonomy. *Macrocerus maracana* Vieillot, 1816, Paraguay.

Normally placed in genus *Ara* (see page 284). Forms superspecies with *P. coultoni* and *P. auricollis*; sometimes considered conspecific with former. Monotypic.

Distribution. NE, C & SE Brazil, Paraguay and NE Argentina.



Descriptive notes. 36-43 cm; 246-266 g. Very similar to *Orthopsittaca manilata* but iris yellow not dark, not contrasting with face, forehead and patch on back red, tail above blue, reddish at base. Immature shows less red.

Habitat. Borders of tropical lowland evergreen forest, palm groves and gallery woodland penetrating *caatinga* vegetation.

Food and Feeding. No information save for a record of seeds of introduced *Melia azedarach*.

Breeding. Evidence for Dec in N Brazil; breeding condition female in Feb. Argentina. In captivity: 3 eggs; incubation lasting 26-27 days; nestling period 70 days.

Movements. Apparently sedentary, but may wander to transitional woodland.

Status and Conservation. VULNERABLE. CITES I. Although the area from which this species has been recorded is vast, in the past few decades at least it has been inexplicably difficult to find. It is probably now extinct in Misiones, Argentina, where in the 1950's it appears to have been relatively numerous. In Paraguay it is still present in Orient. In Brazil it was once common in Rio Grande do Sul but is now extinct there, and indeed only survives in the SE of the country at a handful of sites such as Fazenda Paraíso (São Paulo) and Rio Doce State Park (Minas Gerais); puzzlingly, having once been thought extinct in Rio de Janeiro it has apparently recolonized one area so well that this is perhaps its stronghold in the region. Otherwise it seems only to be at all common in the Serra Negra (Pernambuco) and the Serra do Cachimbo (Pará).

Bibliography. Belton (1984), Brooks *et al.* (1993), Canevari *et al.* (1991), Collar (1996), Collar *et al.* (1994), Eckelberry (1965), Hayes (1995), López (1992), Low (1972, 1997g), Lowen *et al.* (1996), Navas & Bó (1988), Nores & Yzurieta (1994), Olmos (1993), de la Peña (1988), Pinto (1964), Ridgely (1981), do Rosário (1996), Sick (1985, 1993), Stotz *et al.* (1996), Waugh (1997a, 1997b, 1997c, 1997d), Whitney (1996), Willis (1979), Willis & Oniki (1981).

200. Yellow-collared Macaw

Propyrrhura auricollis

French: Ara à collier jaune

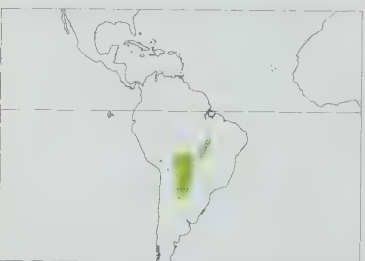
German: Halsbandara

Spanish: Guacamayo Acolarado

Other common names: Golden-collared Macaw

Taxonomy. *Ara auricollis* Cassin, 1853, Bolivia. Normally placed in genus *Ara* (see page 284). Forms superspecies with *P. maracana* and *P. coultoni*. Monotypic.

Distribution. NE Bolivia and N Paraguay to EC & SW Brazil and N Argentina.



Descriptive notes. 37-45 cm; 240-250 g. Bare facial patch from base of bill above and behind eye white; forehead and area bordering lower facial patch blackish green shading to green on nape, sides of neck and rest of plumage, but with narrow yellow collar reaching to sides of breast, primary coverts and primaries above blue, undersides of flight-feathers and tail olive-yellow, tail above reddish basally shading to blue distally. Immature undescribed.

Habitat. Open *cerrado*, gallery woodland in Pantanal and deciduous Chaco woodland, also humid upper tropical forest in foothills in S of range, adapting to areas partly cleared for agriculture and ranchland; to 600 m, although as high as 1700-2000 m reported.

Food and Feeding. Fruit and seeds reported, but no specific information.

Breeding. Dec in Argentina. Nest in hole in tree, in one case 20 m from ground. Eggs 3-4; in captivity, incubation lasts around 23 days, nestling period around 7 weeks.

Movements. Near the Itenez R, Bolivia, birds were noted as common but they left the area before the end of the dry season and were thought to have moved S. Notable flocking behaviour in this species outside breeding season supports idea of at least local movements.

Status and Conservation. Not globally threatened. CITES II. Common and ecologically adaptable. Some concern over trade levels from Bolivia in late 1970's, which escalated to an annual average of 3204 in the years 1980-1983, but which was effectively curtailed with a total trade ban in 1984; rare, presumably being at edge of range, in Paraguay; although populations reported as critically low in Argentina in late 1980's, this now disproven with the species fairly common in N Salta and Jujuy, and has even colonized Calilegua National Park.

Bibliography. Canevari *et al.* (1991), Fuqua (1981), Goodfellow (1933), Hayes (1995), Hoy (1968), Inskipp *et al.* (1988), López (1992), Low (1972, 1997g), Nores & Yzurieta (1994), de la Peña (1988), Pinto (1964), Ridgely (1981), Short (1975), Sick (1985, 1993), Stone & Roberts (1935), Stotz *et al.* (1996), Whitney (1996).

Genus *DIOPSITTACA* Ridgway, 1912

201. Red-shouldered Macaw

Diopsittaca nobilis

French: Ara noble

German: Zwergara

Spanish: Guacamayo Noble

Taxonomy. *Psittacus nobilis* Linnaeus, 1758, South America = Surinam.

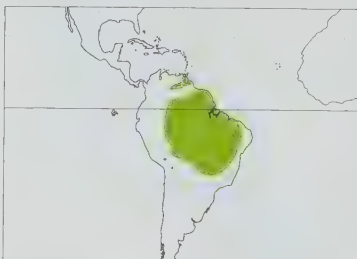
Commonly placed in genus *Ara* (see page 284). Three subspecies recognized.

Subspecies and Distribution.

D. n. nobilis (Linnaeus, 1758) - E Venezuela, the Guianas and N Brazil N of Amazon.

D. n. cumananensis (Lichtenstein, 1823) - N Brazil S of lower Amazon to NE Brazil.

D. n. longipennis Neumann, 1931 - SE Peru and NE Bolivia to C & SE Brazil.



Descriptive notes. 30 cm; 129-169 g. Bare facial mask from dark bill around eye white; forehead to mid-crown blue shading to green of rest of body; bend of wing, carpal edge and lesser underwing-coverts red; undersides of wings and tail dull olive-yellow. Immature lacks blue on crown and has reduced red in wing. Race *cumanensis* larger with bicoloured bill and paler forehead; *longipennis* larger still.

Habitat. Natural savannas (including *cerrado*) and marshy areas with *Mauritia* or *Orbignya* palm stands, gallery woodland, second growth, sparse *caatinga* woodland and cultivated areas adjacent to tall forest.

Food and Feeding. Seeds found in stomachs, but berries of *Cordia*, flowers of *Erythrina* and fruits of *Euterpe* reported. Flocks reported to raid crops and rice fields.

Breeding. Feb-Jun in Guyana. Nest in hole often in living palm, also in arboreal termitarium. In captivity: 4 eggs; incubation lasting 24 days; nestling period 60 days.

Movements. Possibly some wandering occurs in Surinam, where flocks occasionally noted in Sept-Oct in city areas.

Status and Conservation. Not globally threatened. CITES II. Local but fairly common across range, and not under pressure from either habitat loss or trade. Still secure in Venezuela, and likely to be so also in Guyana. Common in sandy savannas in Surinam; restricted to coastal plain in French Guiana. Locally very common in C and NE Brazil.

Bibliography. Davis (1993), Desenne & Strahl (1991, 1994), Graham *et al.* (1980), Harrison & Holyoak (1970), Haverschmidt & Mees (1994), Inskipp *et al.* (1988), Low (1972, 1997g), McLoughlin & Burton (1970), Meyer de Schauensee & Phelps (1978), O'Neill (1981), Pacheco (1994), Pinto (1964), Remsen & Ridgely (1980), Ridgely (1981), Schubart *et al.* (1965), Sick (1985, 1993), Silva (1983, 1996), Snyder (1966), Stager (1961), Stotz *et al.* (1996), Tostain *et al.* (1992), Vane (1950), Whitney (1996), Young (1929).

Genus *RHYNCHOPSITTA* Bonaparte, 1854

202. Thick-billed Parrot

Rhynchopsitta pachyrhyncha

French: Conure à gros bec

German: Kiefernstitich

Spanish: Cotorra Serrana Occidental

Other common names: Macawlet

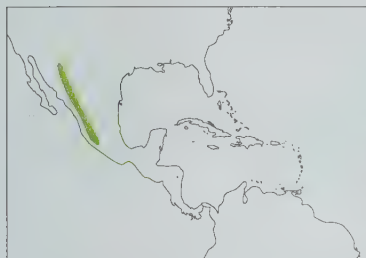
Taxonomy. *Macrocerus pachyrhynchus* Swainson, 1827, tableland of Mexico.

Very close to *R. terrisi* but the two are probably best considered to form a superspecies. Monotypic. **Distribution.** Sierra Madre Occidental, Mexico, formerly wandering into southernmost USA, where perhaps was present for years at a time.

Descriptive notes. 38-43 cm. Green throughout but with red forehead extending as broad line over and behind eye, bare orbital ring dull yellow, red shoulders and lower thighs, and greater underwing-coverts yellow. Immature has less red.

Habitat. Temperate conifer forests including mature pine-oak, pine and fir forests, usually at 2000-3000 m. Recorded once roosting in tropical lowland deciduous forest although flying each day to feed in highland pines.

Food and Feeding. Principally seeds of various pines, most frequently *Pinus arizonica* and *P. ayacahuite*, but also *P. teocote*; irrupting birds, Arizona, fed on *P. leiophylla* seeds before switching to acorns, and elsewhere *Prunus* fruits and legume seeds have been used as supplements.



Breeding. Timed to coincide with peak pine-seed production, so slightly variable between years; eggs recorded May-Aug, and a newly fledged bird in mid-Jun. Nest in hole in tree, usually a pine, more rarely aspen (*Populus tremuloides*) or Douglas fir (*Pseudotsuga taxifolia*). Eggs 1-4, possibly variable with pine crop; incubation in captivity lasts 24-28 days.

Movements. Nomadic in response to pine crop success, thus behaving irruptively in the manner of crossbills (*Loxia*), and for the same reason. Major invasions of southernmost USA formerly occurred, and as with *Loxia* smaller numbers may have stayed to breed or have all-

ways been present. This pattern may apply in many parts of the Sierra Madre Occidental itself, with perhaps only a few core areas permanently holding the species.

Status and Conservation. **ENDANGERED.** CITES I. A BirdLife "restricted-range" species. The destruction of the pine forests of the Sierra Madre has proceeded throughout this century, and for any species dependent on food that is patchy in both space and time, the interposition of even more space between productive areas is an energetic catastrophe leading to spatio-temporal bottlenecks in food supply; it also removes nest-sites. Forest destruction is continuing with the settlement of even remote areas by cattle-ranchers and drug-growers, and with logging operations still active. This parrot is now uncommon throughout its range, and owing to its nomadic behaviour it cannot easily be protected by one or a few reserves; ironically, however, not a single reserve for the conservation of the fauna and flora of the once-extensive pine forests of the Sierra Madre Occidental exists. "Reintroduction" efforts into the USA have been carried out using confiscated cage-birds, but although there was some breeding activity the birds have largely dispersed away from the release site and disappeared.

Bibliography. Arndt (1986), Beissinger & Snyder (1992), Bent (1940), Blake & Hanson (1942), Collar (1996), Collar & Andrew (1988), Collar, Crosby & Stattersfield (1994), Collar, Gonzaga *et al.* (1992), Fleming & Baker (1963), Hanson (1987), Hawley & Brue (1995), Healy & Thormahlen (1988), Howell & Webb (1995a), Hubbard & Crossin (1974), Jeggo (1974), Johnson & Snyder (1987), Johnson *et al.* (1989), King (1978/79), Koschmann & Price (1987), Lamberton (1993), Lanning & Shiflett (1979, 1981, 1983), Leopold (1937), Low (1972), Marshall (1957), Martin (1989), Monson (1965), Ridgely (1981), Schnell *et al.* (1974), Smith (1973), Snyder & Johnson (1988, 1989), Snyder & Wallace (1987), Snyder, Koenig *et al.* (1994), Snyder, Snyder & Johnson (1989), Snyder, Toone *et al.* (1996), Stager (1954), Stotz *et al.* (1996), Taylor (1991), Vorhies (1934), Watson (1993), Wege & Long (1995), Wetmore (1935), Whitney (1996), Witt (1978), Woodard (1980).

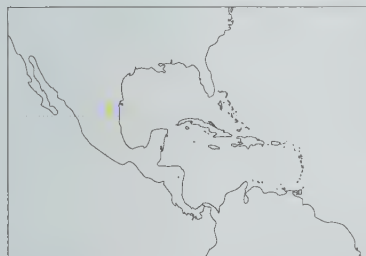
203. Maroon-fronted Parrot

Rhynchopsitta terrisi

French: Conure à front brun **German:** Maronenstirnsittich **Spanish:** Cotorra Serrana Oriental
Other common names: Maroon-fronted Macawlet

Taxonomy. *Rhynchopsitta terrisi* R. T. Moore, 1947, near Galeana, Sierra Potosí, Nuevo León, Mexico. Forms a superspecies with *R. pachyrhyncha*, with which has often been considered conspecific. Monotypic.

Distribution. Sierra Madre Oriental, Mexico.



Descriptive notes. 40-45 cm; 392-468 g. Very like *R. pachyrhyncha* but slightly darker green with darker shoulder patch, red of head dark maroon, greater underwing-coverts olive grey. Immature has less red.

Habitat. Mixed conifer forest generally at 2000-3500 m.

Food and Feeding. Principally seeds of pines including *Pinus arizonica*, *P. gregii*, *P. teocote*, *P. montezumae* and *P. cembroides*, birds exploiting the different species in relation to their annual availability; also seeds of a fir *Abies*, acorns *Quercus* and nectar and seeds of *Agave macraculmis*.

Breeding. As in *R. pachyrhyncha*, nesting coincides with pine crop ripening, and variation in timing no less dramatic, with breeding condition males being collected in May and Oct. Nest in hole in limestone cliff, birds often breeding colonially. Eggs unrecorded, but 1-3 fledged young seen.

Movements. Although some birds may remain throughout year at given sites, there appears to be a fairly regular movement of many birds to the S of the known range for the post-breeding dry season, roughly Oct-Apr.

Status and Conservation. **VULNERABLE.** CITES I. A BirdLife "restricted-range" species. The population is not known to exceed 2000 birds, and the available habitat within its range covers only 7000 km². However, although there has been much habitat loss over time, the species's cliff-nesting habit gives it an advantage over *R. pachyrhyncha*, and there have at least been two reserves established within its range, namely Cumbres de Monterrey National Park, where 1480 birds were counted in Oct 1994, and El Taray Sanctuary near Monterrey, established in 1995 and containing an estimated 100 pairs.

Bibliography. Anon. (1996c), Arndt (1986), Beissinger & Snyder (1992), Collar (1996), Collar & Andrew (1988), Collar, Crosby & Stattersfield (1994), Collar, Gonzaga *et al.* (1992), Ely (1962), Hardy (1967), Hardy & Dickerman (1955), Howell & Webb (1995a), King (1978/79), Lanning & Lawson (1977), Lawson & Lanning (1981), Low (1972), Ridgely (1976, 1981), Robins & Heed (1951), Sada (1987), Snyder & Enkerlin (1996), Snyder *et al.* (1996), Stotz *et al.* (1996), Urban (1959), Valenzuela *et al.* (1981), Wege & Long (1995), Whitney (1996).

Genus *OGNORHYNCHUS* Bonaparte, 1857

204. Yellow-eared Parrot

Ognorhynchus icterotis

French: Conure à joues d'or **German:** Gelbohrsittich **Spanish:** Aratinga Orejigualda
Other common names: Yellow-eared Conure/Parakeet

Taxonomy. *Conurus icterotis* Massena and Souancé, 1854, Ocaña, Colombia. Monotypic.

Distribution. Andes of Colombia and N Ecuador.



Descriptive notes. 42 cm; 285 g. Bill black, forehead and face yellow, extending back to ear-coverts; bare orbital ring grey; mid-crown and area above post-ocular line to nape green, extending round sides of neck to chin, and continuing throughout upperparts and wings, except shoulder yellow; breast and belly yellow shading to greenish on thighs and vent; tail green above, dusky reddish below. Immature undescribed.

Habitat. Humid forest and partially cleared terrain, especially where wax palms (*Ceroxylon*) occur in extensive stands; chiefly at 2000-3000 m, with overall range of 1200-3400 m.

Food and Feeding. Wax palm nuts probably of various species, with *C. quindiuense* and *C. alpinum* recorded, also fruit of *Saurauia tomentosa* and *Sapium*.

Breeding. Mar-May in Colombia; Jul-Oct in Ecuador. Breeds colonially in mature stands of wax palms. Nest in hole high (over 25 m) in *C. quindiuense* in Colombia, *C. ventricosum* in Ecuador, found at 2000-2600 m. Eggs 4. No further information.

Movements. Flocks probably wander nomadically or seasonally in search of food, and if this so then the loss of much feeding habitat will have rendered the species highly exposed to temporal failures in food supply.

Status and Conservation. **CRITICALLY ENDANGERED.** CITES I. Having once been common to abundant locally, this species has suffered a catastrophic collapse of numbers in response to the near-total clearance of Colombia's national tree, the wax palm *C. quindiuense*. Regeneration of these plants is inhibited by cattle-grazing and kikuyu grass, and several species are themselves threatened. The parrot itself has become so rare that it can no longer be found in Colombia, or at least the few birds encountered do not remain on site for long. Colonial nesting behaviour renders birds more vulnerable to trapping, and although little trade ever recorded this bird would now command enormous prices in illicit markets. A tiny population recently discovered in Ecuador is in great need of major conservation effort, but nomadic nature of species may render efforts of little long-term effect.

Bibliography. Arndt (1986), Beissinger & Snyder (1992), Butler (1979), Chapman (1917, 1926), Collar (1996), Collar & Andrew (1988), Collar, Crosby & Stattersfield (1994), Collar, Gonzaga *et al.* (1992), Fjeldså & Krabbe (1990), Hilty & Brown (1986), King (1978/79), Krabbe & Sornoza (1996), Lehmann (1957), Lönnberg & Rendahl (1922), Low (1972), Meyer de Schauensee (1949), Orejuela (1985), Ridgely (1981), Rodríguez & Hernández (1988), Smith (1977a), Stotz *et al.* (1996), Waugh (1996b), Wege & Long (1995), Whitney (1996).

Genus *GUAROUBA* Lesson, 1831

205. Golden Parakeet

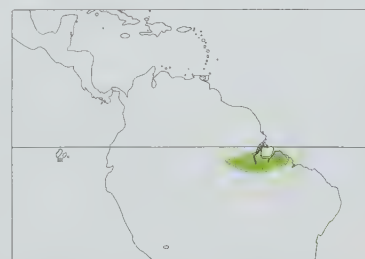
Guarouba guarouba

French: Conure dorée **German:** Goldsittich **Spanish:** Aratinga Guaruba
Other common names: Golden Conure

Taxonomy. *Psittacus Guarouba* J. F. Gmelin, 1788, north-eastern Brazil.

Genus name often spelt *Guaruba*, but original spelling is *Guarouba*. Often placed in genus *Aratinga*. Monotypic.

Distribution. N Brazil in N Maranhão and Pará; recent single records from Rondônia and Mato Grosso.



Descriptive notes. 34-36 cm. Bright yellow throughout, but flight-feathers dark green. Immature has green markings on head, breast and tail.

Habitat. *Terra firme* rain forest, mainly in flooded areas, wandering into seasonally hilly *várzea* forest at times and occupying more open areas, including riverine grasslands with scattered trees, to breed.

Food and Feeding. Fruits or pseudofruits of *Euterpe*, *Anacardium*, *Protium*, *Tetragastris*, *Visnia*, *Inga*, *Byrsonima*, *Carapa*, *Cecropia* and *Oenocarpus*, buds and flowers of *Symphonia*. Attacks maize crops and takes mangoes.

Breeding. Nov-Feb, sometimes earlier or later. Nest high in hole in tree, usually isolated but within short distance of intact forest. Eggs apparently 2-3 per pair, but birds often breed communally with up to 9 young reported in nests with multiple attendants; possibly one female lays, adjusting clutch size to number of helpers available; in a captive group of three males and three females, all six helped rear 14 young. Incubation in captivity lasts around 30 days.

Movements. Apparently nomadic, with birds seeming to wander widely and not predictable at one locality at any one season. Post-breeding dispersal seems, however, to take birds regularly into *várzea*, Feb-Apr.

Status and Conservation. **ENDANGERED.** CITES I. Massive habitat destruction now accelerating within main range of species, where major roads now bisect it both N-S and E-W, compounded by unknown but doubtless intense levels of smuggling of what is one of the most prized birds in aviculture. Persecution as a crop pest, and hunting for both food and sport, are further causes for alarm. Recorded in Amazonia National Park (Pará), Jamari National Forest (Rondônia) and Gurupi Forest Reserve (Maranhão).

Bibliography. Beissinger & Snyder (1992), Collar (1996), Collar & Andrew (1988), Collar, Crosby & Stattersfield (1994), Collar, Gonzaga *et al.* (1992), Descourtiz (1983), Forrester (1993), Hayward (1993), Hellmayr (1929), Hill (1939), King (1978/79), Lieberman (1990), Lo (1995), Low (1972, 1994b, 1995d), Oren & Novaes (1986), Oren & Willis (1981), Pinto (1946, 1964), Ridgely (1981), Schubart *et al.* (1965), Sick (1985, 1990, 1993), Stotz *et al.* (1996), Turner (1940), Walters (1974), Wege & Long (1995), Wenner (1978), Whitney (1996), Yamashita & França (1991).



Genus *ARATINGA* Spix, 1824

206. Blue-crowned Parakeet

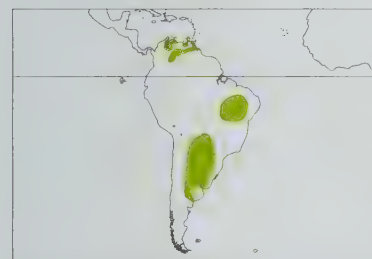
Aratinga acuticaudata

French: Conure à tête bleue **German:** Spitzschwanzsittich **Spanish:** Aratinga Cabeciazul
Other common names: Blue-crowned Conure

Taxonomy. *Psittacus acuticaudatus* Vieillot, 1818, Paraguay. Five subspecies recognized.

Subspecies and Distribution.

A. a. koenigi Arndt, 1995 - NE Colombia and N Venezuela.
A. a. neoxena (Cory, 1909) - 1 Margarita (Venezuela).
A. a. haemorrhous Spix, 1824 - interior NE Brazil.
A. a. neumanni Blake & Traylor, 1947 - upland E Bolivia.
A. a. acuticaudata (Vieillot, 1818) - E Bolivia, Paraguay and SW & S Brazil to W Uruguay (extinct?) and N Argentina.



Descriptive notes. 33-38 cm; 170-176 g. Head dull blue, bare orbital ring white; body and wings green, paler below, sometimes with blue tinge on breast; tail old gold below with reddish inner webs basally, green above with outer feathers brownish red and tipped dark yellow-green. Immature has reduced blue on head. Race *neumanni* has forehead to nape blue, rest of head green, underparts washed blue; *haemorrhous* has only forecrown blue, no bluish wash below, and lower mandible horn-coloured; *koenigi* like *haemorrhous* but much smaller, with less red to inner webs of undersides of tail; *neoxena* same size as *koenigi* but

breast and abdomen bluish green.

Habitat. Arid thornbush, cactus scrub, dry woodland, gallery woodland, *cerrado*, open savanna with *Mauritia* palm stands, Chaco. To 400 m, Colombia, 600 m Venezuela; race *neumanni* occurs at 1500-2650 m in thorny leguminaceous wood with columnar cacti.

Food and Feeding. Berries (e.g. *Condalia lineata*), seeds, nuts, fruits of large cacti. Takes ripe mangoes and attacks corn and sorghum crops, although also said to take seeds of noxious weeds.

Breeding. Apparently Mar-Jul, Venezuela; May-Aug., 1 Margarita; Dec in Argentina. Nest in hole high in tree; on Margarita, *neoxena* uses only the mangrove *Avicennia germinans*. Eggs 2 (Argentina), 3-5 (*neoxena*); in captivity, incubation lasting 23 days, nestling period 50 days.

Movements. In Colombia described as common in gallery woodland, Mar-Jul, but absent rest of year; as these dates coincide with reported breeding season in adjacent Venezuela, the Colombian record may reflect breeding presence and habitat. Clearly some movements occur. Race *neumanni* in Andes nomadic, and other populations likely to show complex movements in response to seasonal changes in food availability.

Status and Conservation. Not globally threatened. CITES II. Common in many parts of range, and officially declared a pest species in Argentina, where more abundant than *Myiopsitta monachus* in Chaco. This country responsible for majority of birds in trade throughout 1980's, when over 15,000 per year were logged on CITES import records; the cumulative effect of this considered probably serious. Generally uncommon in Paraguay. Last recorded in Uruguay over 50 years ago. Race *neoxena* highly threatened by taking of young for pets (although nests situated in La Restinga National Park) and by rat predation of nests, with only 100-200 individuals remaining.

Bibliography. Anon. (1993), Arndt (1980b), Blake & Traylor (1947), Canevari *et al.* (1991), Collar (1997), Contreras *et al.* (1990), Desenne & Strahl (1991, 1994), Fjeldså & Krabbe (1990), Hayes (1995), Hilty & Brown (1986), Inskipp *et al.* (1988), López (1992), Low (1972), Meyer de Schauensee & Phelps (1978), Norez & Yzurieta (1994), de la Peña (1988), Pereira (1994), Ridgely (1981), Rodríguez & Rojas-Suárez (1994), Rojas-Suárez (1994a), Short (1975), Sick (1985, 1993), Stotz *et al.* (1996), Wetmore (1926, 1939), Whitney (1996).

207. Green Parakeet

Aratinga holochlora

French: Conure verte **German:** Grünsittich **Spanish:** Aratinga Verde
Other common names: Green Conure; Pacific Parakeet (*strenua*)

Taxonomy. *Conurus holochlorus* P. L. Sclater, 1859, Jalapa, Vera Cruz.

Often considered conspecific with *A. brevipes* and *A. rubritorquis*. Race *strenua* often regarded as a separate species (see page 285). Three subspecies currently recognized.

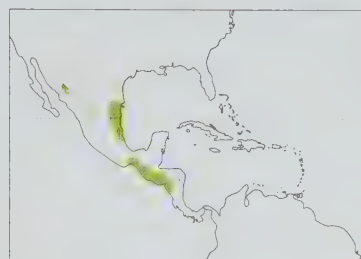
Subspecies and Distribution.

A. h. brewsteri Nelson, 1928 - NW Mexico.
A. h. holochlora (P. L. Sclater, 1859) - NE to S Mexico.
A. h. strenua (Ridgway, 1915) - S Mexico to N Nicaragua.

Descriptive notes. 32 cm; 232 g. Green, more yellowish below; bare orbital ring pale pinkish grey; some birds with a few red flecks on head; underwing-coverts yellowish; tail and flight-feathers olive yellow below. Immature similar to adult. Race *brewsteri* slightly glaucous on head, and generally darker; *strenua* larger and more olivaceous than nominate, with generally larger bill.

Habitat. Deciduous, semi-deciduous, evergreen and gallery woodland, Pacific swamp forest, arid tropical scrub, clearings, edge and upland pine-oak formations; lowlands to 1500 m, but at 1500-2000 m in NW of range and *strenua* reaching 2600 m in Guatemala.

Food and Feeding. Few details; *Mimosa* seeds, *Myrica mexicana* fruits, and maize recorded, and evidently sometimes a crop pest.



Breeding. Season seemingly extended (perhaps in certain years only), with a breeding condition male collected in Aug in Guatemala, and a cliff-nesting colony with young in Jan in Mexico; otherwise generally reported Feb-Apr. Nest in hole in tree, termitarium, or, colonially, in rock crevices in cliffs. In captivity: 4 eggs; incubation lasting 23 days; nestling period 50 days.

Movements. At least local movements occur in response to food supply.

Status and Conservation. Not globally threatened. CITES II. All subspecies remain or have been found to be frequent to common in recent

years. Apparently little affected by habitat destruction; relatively low levels of international trade, 93% of all recorded birds (3000) reported to CITES in 1985-1990 coming from Honduras.

Bibliography. Anon. (1983, 1993), Bangs & Peters (1928), Binford (1989), Clinton-Eitnienar (1984a), Dickey & van Rossem (1938), Edwards & Lea (1955), Gehlbach *et al.* (1976), Griscom (1932), Harrison & Holyoak (1970), Howell & Webb (1995a), Inskipp *et al.* (1988), Land (1970), Lever (1987), Low (1972), Lowery & Dalquest (1951), Monroe (1968), Ridgely (1981), Stotz *et al.* (1996), Sutton & Pettingill (1942), Thurber *et al.* (1987), Wermundsen (1997), Whitney (1996).

208. Socorro Parakeet

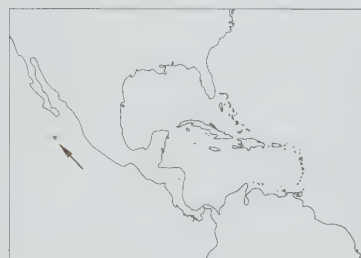
Aratinga brevipes

French: Conure de Socorro **German:** Socorrosittich **Spanish:** Aratinga de Socorro
Other common names: Socorro Conure

Taxonomy. *Conurus holochlorus* var. *brevipes* Lawrence, 1871, Socorro Island.

Very closely related to and usually considered conspecific with *A. holochlora*, but vocal, structural and plumage differences combine to suggest specific status appropriate. Monotypic.

Distribution. Socorro I, off SW Mexico.



Descriptive notes. 31-33 cm. Like *A. holochlora*, but darker green below, orbital skin tinged purplish brown.

Habitat. Forest of *Bumelia socorrensis*, *Ilex socorrensis* and *Guettarda insularis*, mostly above 500 m.

Food and Feeding. Seeds and pulp of *Bumelia* (51% of feeding records), *Guettarda* (19%), *Ilex* (17%) and *Psidium socorrensis* (13%).

Breeding. Oct-Jan. Nest in hole in *Bumelia socorrensis* tree, 2-3-3-8 m above ground, hole orientation in 7 cases was towards S or SW.

Movements. Sedentary.

Status and Conservation. VULNERABLE.

CITES II. A BirdLife "restricted-range" species. Population in 1990-1991 estimated at 400-500 birds in the 35 km² of suitable habitat on the island. Persistent habitat degradation by sheep may affect the species in the near future.

Bibliography. Beissinger & Snyder (1992), Brattstrom & Howell (1956), Collar (1996), Collar & Andrew (1988), Collar, Crosby & Stattersfield (1994), Collar, Gonzaga *et al.* (1992), Howell & Webb (1995a), Low (1972), Rodríguez-Estrella, Mata & Rivera (1992), Rodríguez-Estrella, Rivera & Anguiano (1995), Stotz *et al.* (1996), Wege & Long (1995), Whitney (1996).

209. Red-throated Parakeet

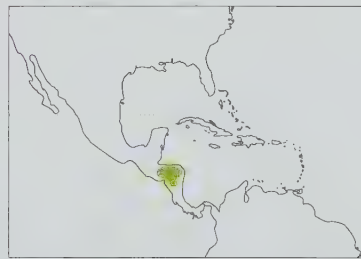
Aratinga rubritorquis

French: Conure à gorge rouge **German:** Rotkehlstittich **Spanish:** Aratinga Gorgirroja
Other common names: Red-breasted Parakeet/Conure

Taxonomy. *Conurus rubritorquis* P. L. Sclater, 1887, South America or West Indies; error = Central America.

Usually considered conspecific with *A. holochlora* but distinct in morphology and to some extent habitat, and apparently also in behaviour and voice. Monotypic.

Distribution. Highlands of E Guatemala and El Salvador (apparently one record only) S through Honduras to N Nicaragua.



Descriptive notes. 26-29 cm. Similar to *A. holochlora*, but decidedly smaller, orbital skin tinged brownish grey, with variable but usually extensive reddish orange chin, throat and foreneck. Immature lacks red on throat.

Habitat. Semi-arid to semi-humid highland pine and pine-oak woodland and adjacent semi-deciduous forest and cloud forest, 600-1800 m or higher.

Food and Feeding. No specific information other than that it prefers waxberries *Myrica mexicana*.

Breeding. No specific information other than that nesting occurs colonially in rock wall.

Movements. Nomadic in non-breeding season (Nov-Apr), ranging down to near sea-level.

Status and Conservation. Not globally threatened. CITES II (where covered by *A. holochlora*). Frequent to common apparently throughout range. Apparently little affected by habitat destruction; relatively low levels of international trade.

On following pages: 210. Scarlet-fronted Parakeet (*Aratinga wagleri*); 211. Mitred Parakeet (*Aratinga mitrata*); 212. Red-masked Parakeet (*Aratinga erythrogenys*); 213. Crimson-fronted Parakeet (*Aratinga finschi*); 214. White-eyed Parakeet (*Aratinga leucophthalmus*); 215. Cuban Parakeet (*Aratinga euops*); 216. Hispaniolan Parakeet (*Aratinga chloroptera*); 217. Sun Parakeet (*Aratinga solstitialis*); 218. Jandaya Parakeet (*Aratinga jandaya*); 219. Golden-capped Parakeet (*Aratinga auricapilla*); 220. Dusky-headed Parakeet (*Aratinga weddellii*); 221. Olive-throated Parakeet (*Aratinga nana*).

Bibliography. Arndt (1978), Dearborn (1907), Dickey & van Rossem (1938), Howell & Webb (1995a), Land (1970), Lawton (1992), Low (1972), Monroe (1968), Ridgely (1981), Steinbacher (1956), Stotz *et al.* (1996), Sweeney (1997c), Thurber *et al.* (1987), Whitney (1996).

210. Scarlet-fronted Parakeet

Aratinga wagleri

French: Conure de Wagler **German:** Columbiasittich **Spanish:** Aratinga de Wagler
Other common names: Red-fronted Parakeet/Conure; Cordilleran Parakeet (*frontata*)

Taxonomy. *Conurus Wagleri* G. R. Gray, 1845, Bogotá. Possibly conspecific with *A. mitrata*. Race *frontata* sometimes considered a distinct species, incorporating race *minor*. Four subspecies normally recognized.

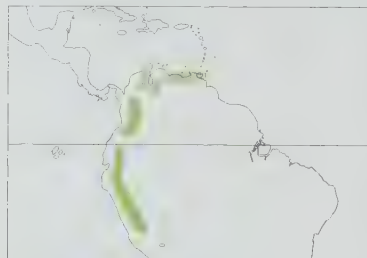
Subspecies and Distribution.

A. w. wagleri (G. R. Gray, 1845) - W & N Colombia to NW Venezuela.

A. w. transilis J. L. Peters, 1927 - E Colombia to N Venezuela.

A. w. frontata (Cabanis, 1846) - W Ecuador and W Peru.

A. w. minor Carriker, 1933 - C & S Peru.



Descriptive notes. 36 cm; 162-217 g. Green, yellower on underparts; forehead and crown red, with some red flecks on throat and bare orbital ring white; greater underwing-coverts, undersides of flight-feathers and tail olive yellow. Immature with reduced red on head. Race *transilis* generally darker; *frontata* has red on head extending to lores and eyes, plus carpal edge and thighs red, and strongly washed bronzy yellow; *minor* like *frontata* but smaller, darker.

Habitat. Light montane evergreen (cloud) forest edge (*Acacia*, *Prosopis* and *Ochroma*), tropical deciduous forest, secondary growth, gallery woodland, semi-humid or humid montane scrub including cactus formations, also fields and orchards, even town parks; most important requirement apparently cliff faces on which to nest and roost; 350-3000 m, occasionally in lowlands.

Food and Feeding. No detailed information. Large flocks reportedly raid croplands, notably maize, causing significant damage.

Breeding. Apr-Jun in Venezuela; Dec-Jun in N Colombia. Nest in fissure in cliff face; breeds colonially.

Movements. Numbers may fluctuate seasonally. Large numbers pass daily through Portachuelo Pass, Venezuela. Jan-Jul, but species almost entirely absent, Sept-Dec.

Status and Conservation. Not globally threatened. CITES II. In many parts of range abundant, and reportedly unaffected by loss of forests; however, evidently reduced in numbers in Colombia, where along with Peru sometimes persecuted as crop pest; reasons for decline in Colombia not clear, but presumably in this case habitat clearance. Still very common in parts of Peru, which exported 16,644 birds in 1982 but subsequently reduced international trade levels substantially, although these began rising again in the early 1990's. Heavily traded, at least internally, in Venezuela.

Bibliography. Butler (1979), Desenne & Strahl (1991, 1994), Fernández-Badillo *et al.* (1994), Fjeldså & Krabbe (1990), Hilty (1985), Hilty & Brown (1986), Inskipp *et al.* (1988), Johnson (1967), Koepeke (1970), Lehmann (1960), Lentino & Portas (1994), Low (1972), Meyer de Schauensee (1944), Meyer de Schauensee & Phelps (1978), Miller (1963), Morrison (1948), O'Neill (1981), Parker *et al.* (1982), Ridgely (1981), Stotz *et al.* (1996), Vriends (1979), Wetmore (1939), Whitney (1996).

211. Mitred Parakeet

Aratinga mitrata

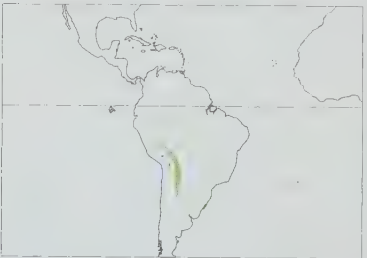
French: Conure mitrée **German:** Rotmaskensittich **Spanish:** Aratinga Mitrada
Other common names: Mitred Conure; Chapman's Parakeet (*alticola*)

Taxonomy. *Conurus mitrata* Tschudi, 1844, Peru. Possibly conspecific with *A. wagleri*. Race *alticola* sometimes considered separate species. Two subspecies currently recognized.

Subspecies and Distribution.

A. m. mitrata (Tschudi, 1844) - C Peru and CE Bolivia to NW Argentina.

A. m. alticola Chapman, 1921 - C Peru in temperate zone at 3400 m.



Descriptive notes. 31-38 cm; 219-275 g. Similar to *A. wagleri frontata*, but forehead purplish and red extending variably, often in flecks, onto cheeks and ear-coverts, but bend of wing only sometimes with red. Immature has reduced red. Race *alticola* has glaucous cast with red restricted to narrow frontal band and a few facial flecks.

Habitat. Montane evergreen and deciduous woodland edge, cloud forest patches, secondary forest, semi-humid and humid montane scrub in arid montane country, 1000-3400 m.

Food and Feeding. No detailed information. Ripening berries and maize recorded.

Breeding. Dec in Argentina. Nest in hollow of tree, also in cliffs. Eggs 2-3.

Movements. Apparently wandering post-breeding flock. Jan, SE Bolivia, and seasonally numerous in intermontane valleys of E Cochabamba; noted among other immigrant parrot species in Lerma valley, NW Argentina, in pursuit of ripening berries.

Status and Conservation. Not globally threatened. CITES II. Generally common and locally abundant. Before mid-1984 virtually all birds in international trade were from Bolivia, which exported 35,100 in the years 1981-1984. In period 1985-1990 no fewer than 108,033 birds exported from Argentina, judged a serious threat that was curbed in 1993 when no quota was authorized.

Bibliography. Anon. (1993), Babarskas *et al.* (1995), Canevari *et al.* (1991), Eisenraui (1935), Fjeldså & Krabbe (1990), Hoppe (1982), Hoy (1968), Inskipp *et al.* (1988), Low (1972), Morrison (1948), Nores & Yzurieta (1994), O'Neill (1981), Orfila (1936), de la Peña (1988), Remsen *et al.* (1986), Ridgely (1981), Stotz *et al.* (1996), Wheatley (1994), Whitney (1996), Zimmer (1930).

212. Red-masked Parakeet

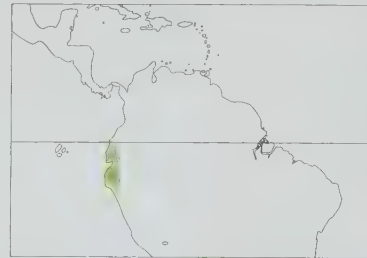
Aratinga erythrogenys

French: Conure à tête rouge **German:** Guayaquilsittich **Spanish:** Aratinga de Guayaquil
Other common names: Red-masked Conure

Taxonomy. *Psittacara (psittacus) Erythrogenys* Lesson, 1844, Guayaquil.

As result of different generic placement, species name formerly listed as *rubrolaryvatus*. Monotypic.

Distribution. W Ecuador and NW Peru.



Descriptive notes. 33 cm. Red forehead, crown and face, with bare orbital ring white; rest of body and wings green, slightly yellowish below, except for shoulder, edge of wing and outermost underwing-coverts red, lower thigh red, underside of wing and tail olive yellow. Immature lacks most red.

Habitat. Chiefly deciduous woodland and adjacent habitats including dry *Acacia* scrub, cultivated land and the edges of towns, but also penetrates both more humid forest and open, sparsely vegetated desert.

Food and Feeding. Likely to be highly variable with season and habitat, but little re-

corded; fruit of Anacardiaceae, Oleaceae and Boraginaceae and *Hyeronima*, flowers of *Erythrina*. **Breeding.** Jan-Mar in Ecuador; Mar-Jul in Peru. Nest in termittarium or hole 2.5-10 m up in tree such as *Ceiba trichistandra* or *Cochlospermum vitifolium*. Eggs 2-4; in captivity, incubation 23 days, nestling period six weeks.

Movements. On Santa Elena Peninsula, Ecuador, birds (probably post-breeding) usually arrive after start of rains in Apr; in Azuay, Ecuador, birds are seemingly absent in rains, Jan-Mar. Shows unpredictable variations in numbers between years, e.g. scarce to numerous on Santa Elena Peninsula, presumably in response to food availability and perhaps other factors such as breeding success in relation to wet/dry periods.

Status and Conservation. Not globally threatened. CITES II. Currently considered near-threatened. A BirdLife "restricted-range" species. Formerly locally common to abundant, with thousands being witnessed over Guayaquil in 1970's, but some populations have suffered steep declines and no record since 1987 has concerned more than 200 birds together. Although recorded from broad spectrum of habitats, ecological needs poorly understood and true effect of extensive habitat loss and disturbance within its range unknown. Trade impact severe, however, with this the commonest captive parrot in its range, and the tenth commonest Neotropical parrot imported into USA, 1981-1985, with 26,375 recorded. In 1993 CITES parties suspended import of the species until Peru establishes an appropriate quota level.

Bibliography. Arndt (1981), Best & Clarke (1991), Best & Kessler (1995), Best, Checker *et al.* (1996), Best, Clarke *et al.* (1993), Best, Krabbe *et al.* (1995), Bloch *et al.* (1991), Butler (1979), Collar (1996), Inskipp & Corrigan (1992), Low (1972), Marchant (1958), O'Neill (1981), Ord (1995), Parker *et al.* (1982), Ridgely (1981), Stotz *et al.* (1996), Wheatley (1994), Whitney (1996), Williams & Tobias (1994).

213. Crimson-fronted Parakeet

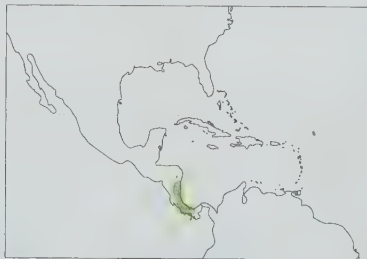
Aratinga finschi

French: Conure de Finsch **German:** Veraguasittich **Spanish:** Aratinga de Finsch
Other common names: Finsch's Parakeet/Conure

Taxonomy. *Conurus finschi* Salvin, 1871, Bugaba, Chiriquí, Panama.

May form a superspecies with *A. leucophthalmus*, with which has been considered conspecific, on basis that *A. l. niceforti* (known from one specimen) is intermediate between present species and *A. l. callogenis*. Monotypic.

Distribution. SE Nicaragua, Costa Rica (primarily Caribbean slope) and W Panama.



Descriptive notes. 28 cm; 150 g. Mostly green, more yellowish below; forehead red, rest of head with a few red flecks; bare orbital ring white; edge of wing and outer underwing-coverts red, often tinged orange; greater underwing-coverts yellow; undersides of flight-feathers and tail olive yellow; thigh with red spot. Immature has reduced red.

Habitat. Light woodland and forest edge, ranchlands with scattered groves, coffee plantations, second growth, agricultural districts, roosting in groves often in or near towns. Ranges up to 1650 m.

Food and Feeding. Flowers and fruits of *Erythrina* and *Inga*, fruits of *Croton*, *Zanthoxylum*, wild figs. Sometimes a pest of maize and sorghum crops.

Breeding. Reportedly Jul in Panama; in Costa Rica, dry and early wet season, i.e. Dec-May. Nest in hole in tree, often old palm stub; may excavate hole in rotten wood or epiphytic mass. Many pairs sometimes nest close together. Eggs 2-4.

Movements. Flocks appear to wander widely over much of year, with irregular or seasonal presence in some places. Numbers increase on Pacific side of Costa Rica in dry season. Probably only seasonal in lower highlands of Chiriquí ranges.

Status and Conservation. Not globally threatened. CITES II. Common and widespread in deforested areas throughout Caribbean slope of Costa Rica, increasing with forest clearance. Locally common and spreading E in Panama. Apparently always uncommon in international trade.

Bibliography. Anon. (1983), Blake (1958), Delgado (1985a), Eisenmann (1957), Hernández-Baños *et al.* (1995), Low (1972), Ridgely (1981), Ridgely & Gwynne (1989), Slud (1964), Stiles & Skutch (1989), Stotz *et al.* (1996), Taylor, K. (1993), Wetmore (1968), Whitney (1996).

214. White-eyed Parakeet

Aratinga leucophthalmus

French: Conure pavoane **German:** Pavausittich **Spanish:** Aratinga Ojiblanca

Other common names: White-eyed Conure

Taxonomy. *Psittacus leucophthalmus* P. L. S. Müller, 1776, Guiana.

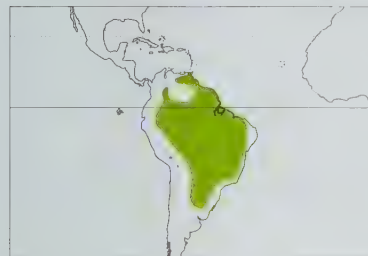
May form a superspecies with *A. finschii*, with which has been considered conspecific. Proposed race *propinquus* probably represents southern populations of a cline of increasing size. Nominate race intergrades throughout C Amazonia with race *callogenus*. Three subspecies recognized.

Subspecies and Distribution.

A. l. nicefori Meyer de Schauensee, 1946 - Meta, E Colombia.

A. l. callogenus (Salvadori, 1891) - SE Colombia, E Ecuador, NW Peru and extreme NW Brazil into C Amazonia.

A. l. leucophthalmus (P. L. S. Müller, 1776) - E Venezuela and the Guianas through virtually all Brazil to N & E Bolivia, Paraguay, N Argentina and N Uruguay.



Descriptive notes. 32-35 cm; 100-218 g. Green, paler below; some red flecking on head and neck; bare orbital ring greyish white; bend and edge of wing and outermost lesser underwing-coverts red; outermost greater underwing-coverts yellow; undersides of flight-feathers and tail olive. Immature mostly lacks red in wing. Race *callogenus* is larger and darker with thicker bill, and tends to be darker green in W; *nicefori* has red band across forehead.

Habitat. Forest edge and adjacent savanna, scrub forest, secondary growth, deciduous or gallery woodland. *Mauritia* palm groves in

llanos, seasonally flooded *várzea* forest along rivers, and openings in rain forest; also mangroves. Generally in lowlands, although up to 2500 m in Bolivia.

Food and Feeding. Fruit, e.g. of *Goupia glabra*, *Tetragastris altissima*, *Allanotoma lineata*, *Norantea guianensis*, *Fagura* and palms, blossoms of *Erythrina* and *Ficus frondosa*, grass seeds and even insects.

Breeding. Feb in the Guianas; possibly Jul-Aug in Peru; Jan-Mar in SW Brazil; around Nov in Argentina. Nest in hole in tree, sometimes high up; also in palm. Eggs 3-4; in captivity, incubation lasts 4 weeks, and nestling period 9 weeks.

Movements. Appears in thousands at one locality in French Guiana in Jun-Aug in response to palm fruiting.

Status and Conservation. Not globally threatened. CITES II. Common over much of enormous range, perhaps most numerous in W Amazonia and least so at N edges of range, being very local in Surinam and relatively so in French Guiana; also scarce in Uruguay. Present in Manu National Park, Peru, where density reaches 3 pairs/km². Regarded in 1970's as uncommon in captivity, even in South America, but 31,169 exported from Argentina, 1985-1990, interpreted as a serious threat to the species in that country. Heavily traded in Venezuela but this not considered serious.

Bibliography. Belton (1984), Canevari *et al.* (1991), Contreras *et al.* (1990), Desenne & Strahl (1991, 1994), Gore & Gepp (1978), Haffer & Fitzpatrick (1985), Harris (1992a), Haverschmidt & Mees (1994), Hayes (1995), Hilty & Brown (1986), Klimaitis & Moschione (1987), López (1992), Low (1972), Meise (1974), Meyer de Schauensee & Phelps (1978), Nores & Yzurieta (1994), Olmos (1993), O'Neill (1981), Orfila (1936), de la Peña (1988), Ridgely (1981), da Rocha *et al.* (1988), do Rosário (1996), Roth (1984a), Schubart *et al.* (1965), Short (1975), Sick (1985, 1993), Snyder (1966), Stotz *et al.* (1996), Terborgh *et al.* (1990), Torrano (1990), Tostain *et al.* (1992), Vriend (1979), Whitney (1996).

215. Cuban Parakeet

Aratinga euops

French: Conure de Cuba

German: Kubasittich

Spanish: Aratinga Cubana

Other common names: Cuban Conure

Taxonomy. *Sittace euops* Wagler, 1832, Cuba.

May form a superspecies with *A. chloroptera*. Monotypic.

Distribution. Cuba; formerly also I of Pines.



Descriptive notes. 26 cm. Green, more yellowish below; red flecks on head and underparts; bare orbital ring white; edge of wing and lesser underwing-coverts red; greater underwing-coverts and undersides of flight-feathers and tail olive yellow. Immature has less red on wings.

Habitat. Savannas, notably where rich in *Copernicia* and *Thrinax* palms, cultivated land with groves, woodland edge, but apparently with requirement to be near larger tracts of original forest.

Food and Feeding. Fruit and/or seeds of *Xanthoxylon*, *Terminalia*, *Melicoccus*, *Roystonea regia*, *Spondias lutea*, *Cordia allcococca*, *Inga*

vera, mangoes, papaya and guava; on I of Pines shoots of *Pinus caribbaea* and palm nuts. Formerly a crop pest, taking flowers and fruit of oranges, heads of maize, and berries of coffee.

Breeding. Apr-Jul. Nest in hole in tree including palms such as *Sabal palmetto*, often originally excavated by Cuban Green Woodpecker (*Xiphidiopicus percussus*), including those in arboreal termitaria. Eggs 3-5; incubation lasts 22-23 days; nestling period 45-50 days.

Movements. Flocks reported to descend occasionally from Trinidad mountains in Sept and Oct.

Status and Conservation. **VULNERABLE.** CITES II. Formerly abundant and one of the most numerous of Cuba's endemic birds, when greatly persecuted as a crop pest. This combined with extensive trapping for the cagebird trade, originally for internal consumption but increasingly for Eastern European markets in the period 1960-1990, and with increasing loss of primary forest, has resulted in a catastrophic collapse in population. The species probably persists in moderate numbers in several relatively inaccessible areas, and at its current greatly reduced levels it may now be stable. There are, however, very few protected areas in which populations occur, the most notable being Ciénaga de Zapata National Park. Extinction on I of Pines occurred around the start of 20th century, although there have been later reports of possible sightings.

Bibliography. Abreu *et al.* (1989), Acosta & Mugica (1988), Alayón (1987), Alayón *et al.* (1987), Alfonso *et al.* (1988), Anon. (1983), Balat & González (1982), Barbour (1923, 1943), Bauer (1989), Beissinger & Snyder (1992), Berovides *et al.* (1982), Bond (1985), Collar (1996), Collar & Andrew (1988), Collar, Crosby & Stattersfield (1994), Collar, Gonzaga *et al.* (1992), Davis (1941b), Garrido (1980), Garrido & García (1975), Low (1972, 1994b),

de las Pozas & González (1984b), Ripley & Watson (1956), Robiller (1990), Rutten (1934), Schneider (1997), Silva, T. (1981), Stotz *et al.* (1996), Sulley & Sulley (1992), Whitney (1996), Wiley (1991b).

216. Hispaniolan Parakeet

Aratinga chloroptera

French: Conure maîtresse

German: Haitisittich

Spanish: Aratinga de la Española

Other common names: Hispaniolan Conure

Taxonomy. *Psittacara chloroptera* Souancé, 1856, Santo Domingo.

Extremely close in appearance and size to *A. leucophthalmus*, and arguably conspecific, although possibly better regarded as a member of an enlarged *A. leucophthalmus* superspecies; may form a superspecies with *A. euops*. Race *maugei* of Mona I (off Puerto Rico) extinct. One extant subspecies recognized.

Subspecies and Distribution.

A. c. chloroptera (Souancé, 1856) - Hispaniola.



Descriptive notes. 32 cm. Green, more yellowish below; some birds show a few red flecks on head; bare orbital ring white; bend and edge of wing and outermost underwing-coverts red; undersides of flight-feathers and tail dull yellowish. Immature has less or lacks red in wing. Extinct race *maugei* barely distinct; duller below, with more red in greater underwing-coverts.

Habitat. All habitats from arid lowlands to more humid montane formations, commonest in latter.

Food and Feeding. Little specific information; noted feeding on *Ficus* fruits, and reported as

a pest on maize crops.

Breeding. No dates given. Nest in arboreal termitarium or hole in tree, in one case 25 m up in a dead pine.

Movements. No information.

Status and Conservation. **VULNERABLE.** CITES II. A BirdLife "restricted-range" species. Formerly (e.g. in 1920's) abundant, and until recently not recognized as at risk, but now believed to be very rare with a status possibly far worse than implied by "Vulnerable"; although reputedly still reasonably common in Sierra de Baoruco in Dominican Republic, observations in past few years have resulted in virtually no records (apparent presence of introduced *A. nana* making situation more difficult to judge). Habitat loss, persecution as a crop pest and use in local and international trade are all assumed to have had an impact. Extinction on Mona I attributed to pigeon hunters.

Bibliography. Anon. (1983), Bond (1928a, 1946, 1985), Collar (1996), Collar *et al.* (1994), Danforth (1929), Greenway, J.C. (1967), Dod (1992), Lever (1987), Low (1972, 1991f), Raffaele (1989), Silva (1984, 1988), Stotz *et al.* (1996), Wetmore & Swales (1931), Whitney (1996), Wiley (1991b).

217. Sun Parakeet

Aratinga solstitialis

French: Conure soleil

German: Sonnensittich

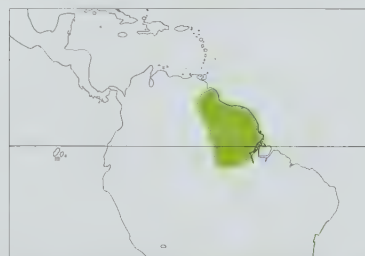
Spanish: Aratinga Sol

Other common names: Sun Conure

Taxonomy. *Psittacus solstitialis* Linnaeus, 1758, Guinea; error = Cayenne.

Sometimes treated as conspecific with *A. jandaya* and *A. auricapilla*, but perhaps better regarded as forming a superspecies with these forms. Possible intergradation with *A. jandaya* on lower Amazon (where range limits uncertain) may simply reflect age and individual variation. Monotypic.

Distribution. Guyana, Surinam and N Brazil; one record from French Guiana; a record reported from SE Venezuela now known to have been inside Brazil.



Descriptive notes. 30 cm. Like *A. jandaya* but with more orange-red on face, less on belly, where yellow extends to vent and thighs; yellow also extends onto back, rump, shoulder and median coverts. Immature replaces much yellow with green.

Habitat. Open savanna and savanna woodland, forested valleys, seasonally flooded (*várzea*) forest and secondary vegetation.

Food and Feeding. Very little information. Records include leguminous fruits, small melostomaceous fruits, red fruits of cacti, with birds observed among but not certainly feeding on *Malpighia* berries.

Breeding. Nest with nestlings in a *Mauritia flexuosa* palm in Feb, Surinam. In captivity: 4 eggs; incubation, by female only, 4 weeks; nestling period around 8 weeks.

Movements. Unclear if movements represent nomadism or seasonal pattern based on food availability, but population on lower Amazon apparently present throughout year.

Status and Conservation. Not globally threatened. CITES II. Immense flocks recorded by R. Schomburgk in NW of range, 1840's, but review of all evidence suggests it is much less common bird than was previously believed. Levels of international trade not excessive in period 1978-1985, but given the great beauty of this species and the notorious internal market for parrots in Brazil there may be a significant undetected influence from trapping.

Bibliography. Freud (1991a), Haverschmidt & Mees (1994), Inskipp *et al.* (1988), Joseph (1992a), Low (1972), Machado & Kwall (1975), Meyer de Schauensee & Phelps (1978), Nieremberg (1972), Niles (1981), Pinto (1964), Ridgely (1981), de Ruiter (1995), Sick (1985, 1993), Siebels & McCullough (1978), da Silva, J.M.C. & Willis (1986), Silva, T. (1993c), Snyder (1966), Stotz *et al.* (1996), Tostain *et al.* (1992), Wheatley (1994), Whitney (1996).

218. Jandaya Parakeet

Aratinga jandaya

French: Conure jandaya

German: Jendayasittich

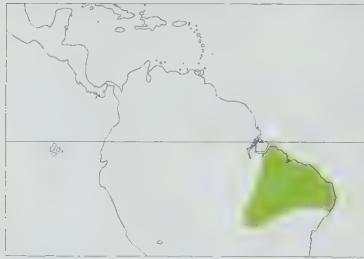
Spanish: Aratinga Jandaya

Other common names: Jandaya Conure, Yellow-headed/Flaming Parakeet

Taxonomy. *Psittacus Jandaya* J. F. Gmelin, 1788, Brazil.

Sometimes treated as conspecific with *A. solstitialis* and *A. auricapilla*, but perhaps better regarded as forming a superspecies with these forms. Monotypic.

Distribution. NE Brazil from E Pará and Goiás to Alagoas.



Descriptive notes. 30 cm. Head and neck yellow with orange-red over bill, round eyes, on throat, breast and belly; back and wings green with primary coverts, secondaries and tips of primaries dark blue; underwing-coverts orange-red; rump and upper tail dull greenish gold, uppertail terminally blue; undersides of flight-feathers and tail grey. Immature greener and duller.

Habitat. Like *A. auricapilla* tied to wooded cover, thus present in humid forest edge, ridge-top groves, coconut plantations, dry woodland and adjacent open areas, including farmland and pastures; appears to avoid

more arid vegetation including *caatinga*. On periphery of Belém, birds use 2-10 m high secondary growth.

Food and Feeding. Birds in Belém observed to feed on fruits of certain Melastomataceae, mango (*Mangifera indica*), caraná (*Mauritia huebneri*) and various *Cecropia*, plus cultivated maize and rice.

Breeding. Aug-Dec in Belém area; Dec elsewhere. Nest in natural or woodpecker hole in trees at least 15 m tall; distance between nests c. 50 m in Belém. In captivity: 3 eggs; incubation, by female only, lasts c. 26 days; nestling period around 8 weeks; in wild 55-60 days noted to elapse between nest preparation and fledging of young.

Movements. No information.

Status and Conservation. Not globally threatened. CITES II. Relatively common and apparently increasing in numbers and range with clearance of continuous forest at E Amazon fringe; however, some evidence also of decrease in S Maranhão. Moreover, effects of trade poorly understood, although this is one of the most prized of South American parrots: no documentation exists of exploitation for internal consumption (although Brazil has notoriously strong community of bird-fanciers), and there is a suspicion that there are high levels of smuggling to SE Asia. Birds were formerly smuggled to Argentina for export (3600 in 1987) but this route closed since 1993.

Bibliography. Anon. (1993), Collar *et al.* (1992), Forrester (1993), Gould & Gould (1991), Harris & Harris (1983), Harrison & Holyoak (1970), Jones (1955), Lamm (1948), Low (1972), Machado & Kawall (1975), Pinto (1964), Ridgely (1981), Ruschi (1979), Saibene (1994), Schubert *et al.* (1965), Sick (1985, 1993), da Silva & Oren (1990), Stager (1961), Stotz *et al.* (1996), Vriends (1979), Whitney (1996).

219. Golden-capped Parakeet

Aratinga auricapilla

French: Conure à tête d'or **German:** Goldkopfsittich **Spanish:** Aratinga Testadorada
Other common names: Golden-capped Conure, Flame-capped Parakeet

Taxonomy. *Psittacus auricapillus* Kuhl, 1820, Bahia.

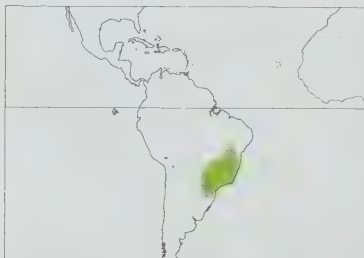
Sometimes treated as conspecific with *A. solstitialis* and *A. jandaya*, but perhaps better regarded as forming a superspecies with these forms. Two subspecies recognized.

Subspecies and Distribution.

A. a. auricapilla (Kuhl, 1820) - N & C Bahia, CE Brazil.

A. a. aurifrons Spix, 1824 - S Bahia S to Paraná, E Brazil.

One record from Paraguay in 1918 may have concerned escaped cage-birds.



Descriptive notes. 30 cm; 130 g. Area around eye onto forehead red, shading through orange on forecrown to yellow on mid-crown; bare orbital skin dark; head, body and wings fairly deep green, more yellowish below, with lower breast to belly red, lower back and rump edged with red, flight-feathers with blue, underwing-coverts orange-red, undersides of tail dull reddish grey. Immature has less red and yellow on head. Race *aurifrons* deeper green below and without red edging on back and rump.

Habitat. Fringes of semi-deciduous forests, being less common in second growth and pastureland with interspersed trees and palms,

but spreading out from shelter of good forest patches to forage in much more open areas including agricultural land, ranging as high as 2180 m.

Food and Feeding. Fruits and seeds, although only specific items recorded are cultivated plants such as okra and maize. When common in last century it was a crop pest.

Breeding. Almost no information. General evidence suggests breeding around Oct.

Movements. No information available, but some movements in response to food availability seem likely.

Status and Conservation. **VULNERABLE.** CITES II. In nineteenth century a common species; possibly in decline for two hundred years with steady and now extensive clearance and fragmentation of its habitat, and perhaps owing to trade for internal markets. Now seemingly very scarce throughout S part of range, with centre of abundance in Minas Gerais, but both forest clearance and trapping for local consumption continue unchecked. Recorded from Chapada Diamantina and Monte Pascoal National Parks (Bahia), Caratinga Reserve, Rio Doce State Park and Serra da Canastra National Park (Minas Gerais).

Bibliography. Anon. (1993), Beissinger & Snyder (1992), Collar (1996), Collar & Andrew (1988), Collar, Crosby & Stattersfield (1994), Collar, Gonzaga *et al.* (1992), Descourtiz (1983), Forrester (1993), Hayes (1995), Inskipp *et al.* (1988), Low (1972), Pinto (1935, 1964), Ridgely (1981), do Rosário (1996), Sick (1985, 1993), Stotz *et al.* (1996), Wege & Long (1995), Whitney (1996).

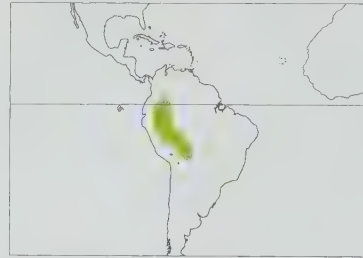
220. Dusky-headed Parakeet

Aratinga weddellii

French: Conure de Weddell **German:** Weddellsittich **Spanish:** Aratinga Cabecifusca
Other common names: Dusky-headed Conure, Weddell's Parakeet

Taxonomy. *Conurus Weddellii* Deville, 1851, Pebas, upper Amazon. Monotypic.

Distribution. SE Colombia S through E Ecuador, E Peru and NW Brazil to NE Bolivia.



Descriptive notes. 28 cm; 96-129 g. Head and sides of neck brownish grey with feathers tipped bluish grey, giving slight scaled effect; bare orbital ring yellowish white; breast grass green shading to lemon yellow on belly and thighs, shading green on vent; nape to rump green with vague dusky markings; wings green with outer secondaries, primary coverts and primary tips dark blue; tail green tipped dark blue. Immature similar.

Habitat. Seasonally flooded *várzea* forest, riparian growth, tall swampy second growth, scrublands and clearings, generally avoiding *terra firme* forest; also reported in cane and

coffee plantations. Lowlands to 750 m.

Food and Feeding. Poorly documented. Fruits of palms, *Goupia glabra*, *Inga edulis*, *Mimosa*, blossoms and inflorescences such as of *Erythrina* and *Dioeclea glabra*.

Breeding. Evidently Jun-Aug throughout range, with possible further record in Feb, Colombia: Apr-Jun in E of range in Brazil. Nest in hole in dead tree or arboreal termitarium, usually adjacent to water; pair witnessed enlarging old woodpecker hole. In captivity: 3-4 eggs; incubation, by female only, 23 days; nestling period 50 days.

Movements. Formation of large flocks at particular food sources suggests at least local displacements in response to changes in supply.

Status and Conservation. Not globally threatened. CITES II. Common in most of range, even in degraded and settled areas; evidence indicates a steady increase with clearance of continuous forest and construction of roads through such terrain. Traded in moderate numbers up to mid-1980's, with 17,195 exported by Bolivia in 1980-1983, but currently banned from export in all range states.

Bibliography. Allen (1995), Arndt (1980a), Bond & Meyer de Schauensee (1943), Hilty & Brown (1986), Inskipp *et al.* (1988), Low (1972), Nicholls (1983, 1994), O'Neill (1974, 1981), O'Neill & Pearson (1974), Parker *et al.* (1982), Pearson (1972, 1975c), Pinto (1964), Ridgely (1981), Roth (1984a), de Ruiter (1994a), Scott (1997), Sick (1985, 1993), Stotz *et al.* (1996), Terborgh & Weske (1969), Whitney (1996).

221. Olive-throated Parakeet

Aratinga nana

French: Conure aztèque **German:** Aztekensittich **Spanish:** Aratinga Pechusica
Other common names: Olive-throated Conure, Jamaican Parakeet/Conure (*nana*), Aztec Parakeet/Conure (*astec*)

Taxonomy. *Psittacara nana* Vigors, 1830, Jamaica.

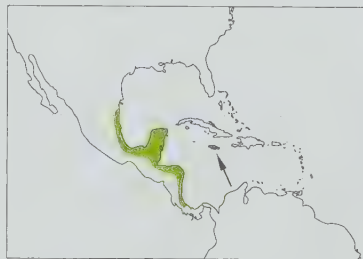
Curiously disjunct distribution largely accounts for frequent treatment of race *astec* as distinct species, incorporating race *vicinialis*. Three subspecies normally recognized.

Subspecies and Distribution.

A. n. vicinialis (Bangs & Penard, 1919) - NE Mexico.

A. n. astec (Souancé, 1857) - Caribbean slope from SE Mexico to W Panama.

A. n. nana (Vigors, 1830) - Jamaica.



Descriptive notes. 22-26 cm; 72-85 g. Green, yellow on ear-coverts and rump; bare orbital skin white; throat and breast olive brown, shading to olive on belly and vent; outer webs of flight-feathers dull blue; flight-feathers grey below; tail yellowish below. Immature similar. Race *astec* paler and has smaller bill; *vicinialis* brighter than *astec* with greener tone in undersides.

Habitat. Dense humid forest and edge, deciduous woodlands (probably main habitat), pine stands, riparian vegetation, scrublands, plantations, clearings with groves, in coastal plains and foothills. Least common in humid forest in Central

America, where extends up to 1100 m; commonest in Jamaica in mid-level wet limestone forests.

Food and Feeding. Fruit of figs, *Inga*, *Hura* and *Hieronyma*; some melastomes; flowers of *Cannabis sativa*, Jamaica. Earlier reports mention nanchi and guava fruits. Often cause damage to crops, notably maize.

Breeding. Mar in Jamaica; Apr-May in Belize and Guatemala. Nest in cavity in termitarium, often excavated by the birds themselves, and often along riverbank or at forest edge. Eggs 3-5.

Movements. On Jamaica noted to visit arid S forests when certain food available, but otherwise absent; such responses to food supply seem likely to occur elsewhere. Records from W Panama appear to represent wanderers from Costa Rica, where much less common and perhaps only seasonal S of Limón.

Status and Conservation. Not globally threatened. CITES II. Much the commonest parrot in Yucatán, 1950's, and generally at least locally common throughout its range, but with some local declines, also believed on Jamaica, in response to forest clearance. Persecuted as crop pest, Jamaica. Uncommon in international trade.

Bibliography. Binford (1989), Bond (1985), Clinton-Eitniece (1984a), Clinton-Eitniece *et al.* (1989), Downer & Sutton (1990), González-García (1993), Hardy (1966), Hess (1997), Howell & Webb (1995a), Inskipp *et al.* (1988), Land (1970), Latta *et al.* (1997), Low (1972), Lowery & Dalquest (1951), Monroe (1968), Parkes (1976), Paynter (1955), Ridgely (1981), Ridgely & Gwynne (1989), Russell (1964), Slud (1964), Smith, P.W. (1996), Stiles & Skutch (1989), Stotz *et al.* (1996), Wetmore (1968), Whitney (1996), Wiley (1991b).



222. Orange-fronted Parakeet

Aratinga canicularis

French: Conure à front rouge **German:** Elfenbeinsittich **Spanish:** Aratinga Frentinaranja
Other common names: Orange-fronted Conure

Taxonomy. *Psittacus canicularis* Linnaeus, 1758, north-western Costa Rica. Forms a superspecies with *A. aurea*. Three subspecies recognized.

Subspecies and Distribution.

A. c. clarae R. T. Moore, 1937 - W Mexico from Sinaloa to C Michoacán.

A. c. eburnirostrum (Lesson, 1842) - SW Mexico from E Michoacán to Oaxaca.

A. c. canicularis (Linnaeus, 1758) - Pacific coast and foothills from S Mexico (Chiapas) to W Costa Rica.



Descriptive notes. 23-25 cm; 68-80 g. Forehead to lores orange-peach; mid-crown dull blue; bare orbital ring yellow; hindcrown, nape, back and wings dull green; throat and breast pale olive brown; belly to vent yellowish green; flight-feathers show blue; tail green above, yellowish below. Immature has reduced orange-peach on forehead. Race *eburnirostrum* with narrower orange-peach forehead, greener below with brown spot on base of lower mandible; *clarae* with orange-peach reduced to narrow band, throat and breast greener, bill spot black.

Habitat. Forest edge, deciduous woodland, Pacific swamp forest, savannas and arid thorn scrub, adapting well to areas partly opened up for pasture and travelling to rest in plantations of mangoes and palms often near urban areas; chiefly in lowlands but ranging up to 1500 m.

Food and Feeding. Fruits, e.g. *Ficus*, *Bursera*, *Brosimum*; flowers, e.g. *Gliricidia*, *Combretum*; and seeds, e.g. *Ceiba*, *Inga*. Wandering flocks can cause serious damage to young maize and ripening bananas.

Breeding. Jan-May in Mexico and El Salvador; dry season in Costa Rica. Nest in cavity in arboreal termitarium of *Nasutitermes nigricipes*, usually excavated by the birds themselves, sometimes in old woodpecker hole or natural fissure. Eggs 3-5; incubation, by female only, lasts c. 30 days; nestling period about 6 weeks.

Movements. Forms larger flocks and shows nomadism outside breeding season, wandering to much higher elevations.

Status and Conservation. Not globally threatened. CITES II. With *Amazona albifrons* the most numerous parrot on Pacific slope of Middle America. Apparently little affected by habitat destruction; relatively low levels of international trade. However, in many areas of Costa Rica population has decreased owing to pet trade (perhaps mainly for domestic consumption), and decline in El Salvador also noted.

Bibliography. Anon. (1983), Binford (1989), Chapman *et al.* (1989), Clifton (1994), Dickey & van Rossem (1938), Hardy (1963, 1965, 1966), Howell & Webb (1995a), Inskipp *et al.* (1988), Land (1970), Lever (1987), Low (1972), McLellan (1927), Monroe (1968), Paynter (1956), Raiffaie (1989), Ridgely (1981), Rowley (1966), Schaldach (1963), Slud (1964), Stiles & Skutch (1989), Stotz *et al.* (1996), Tashian (1953), Thurber (1978), Wetmore (1941a, 1944), Whitney (1996), Zimmerman & Harry (1951).

223. Peach-fronted Parakeet

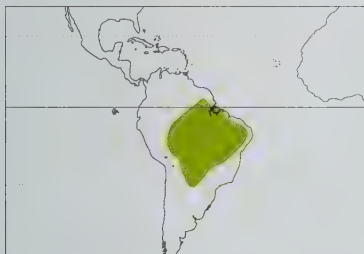
Aratinga aurea

French: Conure couronnée **German:** Goldstirnsittich **Spanish:** Aratinga Frentidorada
Other common names: Peach-fronted Conure, Golden-crowned Parakeet/Conure

Taxonomy. *Psittacus aureus* J. F. Gmelin, 1788, Bahia.

Forms a superspecies with *A. canicularis*. Proposed race *major* probably represents S populations of a cline of increasing size. Monotypic.

Distribution. S Surinam through N, C & interior S Brazil to SE Peru, E Bolivia, Paraguay and N Argentina.



Descriptive notes. 23-28 cm; 74-94 g. Forehead to mid-crown peachy orange separated from pale orange bare orbital ring by line of dull green that extends below and behind eye onto rest of upperparts, wings and tail; hindcrown dull blue; cheeks and underparts pale olive-brown, shading greenish yellow on vent and undertail-coverts; greenish blue in flight-feathers. Differs from *A. canicularis* in colour of bill, and of throat and breast. Immature has less orange and blue on head.

Habitat. Tropical savanna with *Mauritia* palm groves, gallery forest, *cerrado*, remnant woodlots adjacent to agricultural land and even

urban areas, savanna-like "campo rupestre" with many shrubs, herbs and scattered trees, moving between wooded areas and open grassland habitats to forage. Lowlands to 600 m.

Food and Feeding. Much foraging done on ground. Seeds (but not pulp) of *Ilex*, *Banisteriosis*, *Campomanesia adamantinum*, *Eucalyptus*, *Symplocos* and *Aegiphylia*, flowers of *Qualea*, *Caryocar brasiliensis* and *Tabebuia*, pulp of *Anacardium*, and leaves (mandibulated but perhaps not ingested) of *Vochysia thyrsoidea* and *Ocotea*. Sometimes also termites and the larvae of flies, beetles and moths. Gleans harvested fields for soya beans, rice and maize, and can cause damage prior to harvesting.

Breeding. Jun-Jul in SE Peru; Sept-Dec in C Brazil. Nest excavated upwards into termitarium, either on ground or in *cerrado* tree. Eggs 2-4; in captivity, incubation lasts 23 days, nestling period 48 days.

Movements. Some local movements seem likely in response to food availability, but nothing recorded.

Status and Conservation. Not globally threatened. CITES II. Common in Sipaliwini savanna, Surinam, and abundant in *campos cerrados*, Paraguay. Across most of Brazil it is the commonest *Aratinga* and may be increasing with the clearance of blocks of more humid forest for agriculture, but suffers extensively from taking of nestlings for sale as pets, with very high mortality in rearing stages. In 1985-1989 45,154 birds were exported from Argentina, but these must have been smuggled in from Brazil for the purpose as the species, although once common, is now rare in Argentina (two records since 1956), for reasons unknown; it is still officially on the list of pest species.

Bibliography. Antas & Cavalcanti (1988), Canevari *et al.* (1991), Cherrie & Reichenberger (1923), Contreras *et al.* (1990), Darrieu (1979), Galetti & Pedroni (1996), Graham *et al.* (1980), Hadgkiss (1978), Haverschmidt & Mees (1994), Hayes (1995), Inskipp *et al.* (1988), López (1992), Low (1972), Norees & Yzurieta (1994), O'Neill (1981), Olrog (1958), de la Peña (1988), Pinto (1964), Ridgely (1981), do Rosário (1996), Szima (1989), Schubart *et al.* (1965), Short (1975), Sick (1985, 1993), Stotz *et al.* (1996), Vriends (1979), Whitney (1996).

224. Brown-throated Parakeet

Aratinga pertinax

French: Conure cuivrée **German:** Braunwangensittich **Spanish:** Aratinga Pertinax
Other common names: Brown-throated Conure, Caribbean Parakeet; Veragua's Parakeet (*ocularis*)

Taxonomy. *Psittacus pertinax* Linnaeus, 1758, Curaçao.

Forms a superspecies with *A. cactorum*. Considerable geographical variation reflected in number of subspecies recognized, although some differences are minor and very possibly clinal in nature. Disjunct form *ocularis* sometimes treated as separate species. Fourteen subspecies currently recognized.

Subspecies and Distribution.

A. p. ocularis (P. L. Sclater & Salvin, 1864) - Panama.

A. p. aeruginosa (Linnaeus, 1758) - N Colombia to NW Venezuela.

A. p. griseipecta Meyer de Schauensee, 1950 - Sinú Valley, NE Colombia.

A. p. lehmanni Dugand, 1943 - E Colombia E possibly into W Venezuela.

A. p. arubensis (Hartert, 1892) - Aruba (Netherlands Antilles).

A. p. pertinax (Linnaeus, 1758) - Curaçao (Netherlands Antilles).

A. p. xanthogenia (Bonaparte, 1850) - Bonaire (Netherlands Antilles).

A. p. tortugensis (Cory, 1909) - I Tortuga (Venezuela).

A. p. margaritensis (Cory, 1918) - I Margarita (Venezuela).

A. p. venezuelae Zimmer & Phelps, 1951 - Venezuela except NW, possibly W, extreme NE & SE.

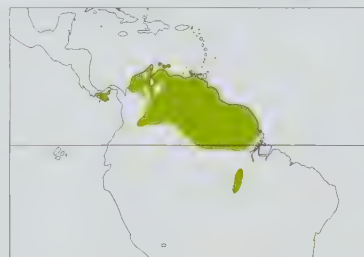
A. p. surinama Zimmer & Phelps, 1951 - NE Venezuela and the Guianas.

A. p. chrysophrys (Swainson, 1838) - SE Venezuela and adjacent Brazil.

A. p. chrysogenys (Massena & Souancé, 1854) - R Negro, NW Brazil; possibly this form recently near Mamirauá Reserve on R Solimões.

A. p. paraensis Sick, 1959 - R Tapajós and R Cururu, NC Brazil.

Introduced (*pertinax*) to St Thomas (Virgin Is).



Descriptive notes. 25 cm; 76-102 g. Forehead, face and chin yellow; breast dull olive; belly grass green with orange patch; mid-crown and rest of upperparts green; flight-feathers and tail edged and tipped dullish blue. Immature largely lacks yellow. Race *xanthogenia* has orange-yellow extending onto crown and nape; *arubensis* mixes brown on yellow face; *aeruginosa* as previous race, with buff forehead; *griseipecta* as last but cheeks and breast olive-grey; *lehmanni* as *aeruginosa* but more orange-yellow round eye; *tortugensis* as *aeruginosa* but more orange-yellow on sides of head; *margaritensis* has whitish forehead and

face olive-brown; *venezuelae* as last but more yellowish above; *chrysophrys* as *margaritensis* but face richer brown; *surinama* as last but more orange below eye and breast greener; *chrysogenys* darker than others with no frontal band; *paraensis* as last with orange-yellow belly; *ocularis* similar to *margaritensis* but paler, with no frontal band.

Habitat. Savannas and semi-open arid scrubby areas with cacti and acacias, also mangrove woodland, tropical deciduous forest, gallery and white sand forest, rhizophore mangroves, edges of humid evergreen forest, cultivated areas and pastures where groves of palms and other trees remain; lowlands to 1200 m.

Food and Feeding. Up to 70% of food plants used, NW Venezuela, were planted by man: seeds of *Cassia*, *Peltophorum*, *Lagerstroemia*, *Cedrela*, fruit of *Mangifera*, *Muntingia*, *Swietenia*, *Psidium*, *Solanum*, flowers of *Tabebuia*, *Delonix*, *Erythrina*, *Gliricidia*, and leaves of *Spathodea*; elsewhere, *Caesalpinia*, *Acacia*, *Prosopis*, *Cereus*, *Malpighia*, *Fagara*, *Curatella* and *Cochlospermum* also recorded. Reportedly a crop pest on maize, Colombia, and known as such, Netherlands Antilles, where also a regular visitor to fruit plantations.

Breeding. Feb-Apr in E Colombia and NW Venezuela, although Oct-Apr also noted for latter area; almost throughout year in Surinam, where nests found Jan-Mar, Jun-Sept, and Nov; similarly in Netherlands Antilles. Nest in hole excavated in arboreal termitarium, particularly that of genus *Nasutitermes*, sometimes in palm stub or tree with natural cavity, or in cliff face, old wall, limestone cliff, cave, earth bank or seacoast rocks; often in small colonies, e.g. with several pairs using one rotten tree. Eggs 2-7 (9 once found in one nest, suggesting second female involved, although possibly only after first deserted); in captivity, incubation 23 days, probably by female only. Nestling period in wild only 36-37 days.

Movements. Some seasonal movement to more humid areas during driest months, Santa Marta area, Colombia. In Aragua, Venezuela, highest numbers occur in May-Sept probably in response to maize and sorghum harvest, birds moving in Nov-Apr to foothill woodlands and savannas, to breed.

Status and Conservation. Not globally threatened. CITES II. Locally common, Panama. Most numerous parrot in Caribbean lowlands and llanos in Colombia and in Guyana and N Surinam, and abundant on all three of Netherlands Antilles. In one area of NW Venezuela a density of 5-89 birds/km² has been estimated. Some evidence that mainland populations are expanding their ranges in response to forest clearance for ranchland. Little exploited for international trade, although local pressure heavy in Venezuela, with two island races, *margaritensis* and *tortugensis*, particularly affected (the former is still very numerous, while the latter is not and is exposed to severe climatic

fluctuations that affect its status); birds also persecuted in Venezuela as pests of maize, sorghum, sesame and sunflower crops.

Bibliography. Albornoz & Fernández-Badillo (1994a, 1994b), Bond (1985), Burkard & Ender (1983), Desenne & Strahl (1991, 1994), Dugand (1947), Fernández-Badillo *et al.* (1994), Friedmann (1948b), Haverschmidt & Mees (1994), Hilty & Brown (1986), Lever (1987), Low (1972), Meyer de Schauensee & Phelps (1978), Ridgely (1981), Ridgely & Gwynne (1989), Rodríguez & Rojas-Suárez (1994), Schäfer & Phelps (1954), Shore-Baily (1915), Sick (1985, 1993), Snyder (1966), Stotz *et al.* (1996), Tostain *et al.* (1992), Voous (1983), Vriends (1979), Wetmore (1939, 1968), Whitney (1996), Wiley (1993).

225. Cactus Parakeet

Aratinga cactorum

French: Conure des cactus **German:** Kaktussittich **Spanish:** Aratinga Cactácea
Other common names: Cactus Conure, Caatinga Parakeet/Conure

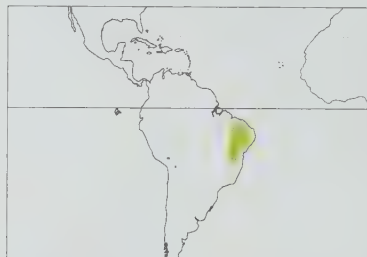
Taxonomy. *Psittacus cactorum* Kuhl, 1820, south-eastern Brazil.

An arid-country representative of *A. pertinax*, possibly conspecific but probably better treated as forming a superspecies. Two subspecies recognized.

Subspecies and Distribution.

A. c. caixana Spix, 1824 - NE Brazil.

A. c. cactorum (Kuhl, 1820) - CE Brazil.



Descriptive notes. 25 cm. Forecrown, lores, throat, sides of neck and breast light brown; bare orbital ring whitish; ear-coverts, nape and upperparts green; flight-feathers bluish; belly to vent dull orange. Immature has green crown, underparts duller. Race *caixana* paler.

Habitat. Arid thorny *caatinga* vegetation dominated by shrubs and succulents, open woodland (*angical*) with *Anadenanthera macrocarpa*, and second-growth *caatinga* following cultivation or burning; also degraded pasture and less arid woodland.

Food and Feeding. No specific information; flower buds reported, also occasional damage

to crops such as rice and maize.

Breeding. No information from wild. In captivity: up to 6 eggs laid; incubation period as short as 16 days between last egg being laid and first hatching; nestling period 6 weeks.

Movements. No information, but some local movements in response to food availability seem likely.

Status and Conservation. Not globally threatened. CITES II. Generally common, often commonest psittacid, with little trade pressure. However, *caatinga* is poorly protected (0-1% of original area inside reserves) and being steadily degraded. The species occurs in Serra da Capivara National Park.

Bibliography. Forrester (1993), Harris & Harris (1982), Lamm (1948), Lovell-Keays (1914a, 1914b), Low (1972), Novaes (1992), Olmos (1993), Olrog (1968), Pinto (1964), Prante (1986), Ridgely (1981), Ruschi (1979), Sargeant & Wall (1996), Sick (1985, 1993), Stotz *et al.* (1996), Vriends (1979), Whitney (1996), Willis (1992).

Genus NANDAYUS Bonaparte, 1854

226. Nanday Parakeet

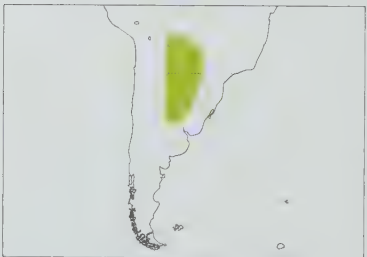
Nandayus nenday

French: Conure nanday **German:** Nandaysittich **Spanish:** Aratinga Ñanday
Other common names: Nanday Conure, Black-headed/Black-hooded Conure/Parakeet

Taxonomy. *Psittacus nenday* Vieillot, 1823, Paraguay.

Sometimes placed in *Aratinga*. Monotypic.

Distribution. SE Bolivia and SW Brazil through C Paraguay to N Argentina. Small numbers feral in Buenos Aires city; also in Canada and USA.



Descriptive notes. 32-37 cm; 120-141 g. Blackish face and crown with flesh-coloured periorbital area; yellowish green on cheeks, belly and underwing-coverts, a shade darker on nape, back, rump, upperwing-coverts and vent; breast light blue; thighs orange red; flight-feathers above blue, below dark; tail above olive green tipped blue, below dark. Immature has less blue on breast, shorter tail.

Habitat. Gallery forest, isolated deciduous woodlots and palm stands in Pantanal, open savanna country and pastures; also moist Chaco and low dry scrub. Up to 800 m or more.

Food and Feeding. Palm nuts, seeds, fruits,

berries, flowers and buds; often taken from the ground.

Breeding. Nov. Nest in wild prospected by up to 12 birds, in holes in trees and tops of fence posts in stockyards. Eggs 4; in captivity, 3 eggs, incubation 21-23 days, and nestling period c. 8 weeks.

Movements. Flocks may wander widely in non-breeding season, and the first confirmed record from Bolivia may have represented such a long-range movement from Pantanal 300 km to the E.

Status and Conservation. Not globally threatened. CITES II. Common to locally abundant, and in parts of Brazil the commonest parrot, with habitat little modified except by grazing; range in Paraguay and Argentina reportedly extending owing to land settlement and cultivation, and in Argentina (where present in Pilcomayo National Park) officially listed as a pest. CITES records show average 19,000 (minimum) exported 1985-1990, 99% reportedly from Argentina though most believed originating in Paraguay; this is regarded as excessive.

Bibliography. Anon. (1985b, 1993), Canevari *et al.* (1991), Contreras (1979b), Contreras *et al.* (1990), Fisk & Crabtree (1974), Hayes (1995), Inskipp *et al.* (1988), Kawata *et al.* (1977), Klimaitis & Moschione (1987), Kratter

et al. (1993), Lever (1987), López (1992), Low (1972), Naumburg (1930), Nores & Yzurieta (1994), de la Peña (1988), Ridgely (1981), Short (1975), Sick (1985, 1993), Steinbacher (1962), Stotz *et al.* (1996), Vriends (1979), Wetmore (1926), Whitney (1996).

Genus LEPTOSITTACA

Berlepsch & Stolzmann, 1894

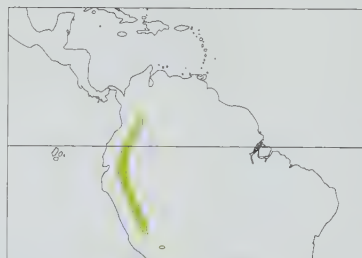
227. Golden-plumed Parakeet

Leptosittaca branickii

French: Conure à pinceaux d'or **German:** Pinselsittich **Spanish:** Aratinga de Pinceles
Other common names: Golden-plumed Conure/Parrot

Taxonomy. *Leptosittaca branickii* Berlepsch and Stolzmann, 1894, Maraynioc. Monotypic.

Distribution. S Colombia in C Andes S through Ecuador to C Peru.



Descriptive notes. 35 cm. Green, with narrow frontal band orange, shading to yellow on lores, below white periorbital patch, and extending on elongated feathers behind eye; abdomen washed yellow with indistinct broad orange bars; flight-feathers yellowish below; tail dull green above, dull reddish below. Immature undescribed.

Habitat. Temperate cloud forest, stunted timberlines and elfin woodland, notably but not always *Podocarpus*-dominated areas, generally at 2400-3400 m although as low as 1400 m at times.

Food and Feeding. *Podocarpus* seeds commonly preferred, but also takes those of *Prumnopitys montanus* and *Croton*, plus fruits of *Ficus* and *Melastomataceae*, even reportedly cultivated maize.

Breeding. Feb in Colombia, with evidence for Aug in Ecuador. Pair seen apparently prospecting in holes in dead *Ceroxylon quindiuense* palms in May, Colombia. No other information.

Movements. Apparently highly nomadic, and commonly gregarious: the species may disappear from a forested region from which it has been known for years, only to reappear much later, but may also do this over much shorter time spans in some areas. This behaviour may be related to temporally patchy distribution of suitable *Podocarpus* cones.

Status and Conservation. **VULNERABLE.** CITES II. Heavy deforestation in N parts of range is a concern, particularly because the species appears to depend on unpredictable food resources and cannot be conserved with certainty in any one reserve. Recorded in Los Nevados, Munchique, Puracé, Cueva de los Guácharos National Parks, Ucumari Regional Park, Acaime Natural Reserve and Galeras and Isla la Corota Sanctuaries (Colombia), Río Mazan Reserve, Huashapampa Protection Forest and Podocarpus National Park (Ecuador) and Río Abiseo National Park (Peru). Unknown in trade.

Bibliography. Arndt (1986), Beissinger & Snyder (1992), Bloch *et al.* (1991), Butler (1979), Collar (1996), Collar & Andrew (1988), Collar, Crosby & Stattersfield (1994), Collar, Gonzaga *et al.* (1992), Davies *et al.* (1994), Fjeldså & Krabbe (1990), Flanagan & Galvez (1996), Hilty & Brown (1986), King (1989), Low (1972), Negret & Acevedo (1990), O'Neill (1981), Parker *et al.* (1982), Pulido (1991), Rasmussen *et al.* (1996), Ridgely (1981), Salaman & Gandy (1993), Stotz *et al.* (1996), Walker & Jacobs (1995), Wege & Long (1995), Whitney (1996), Williams & Tobias (1994).

Genus CYANOLISEUS Bonaparte, 1854

228. Burrowing Parakeet

Cyanoliseus patagonus

French: Conure de Patagonie **German:** Felsensittich **Spanish:** Loro Barranquero
Other common names: Patagonian Parrot/Conure/Parakeet, Burrowing Parrot

Taxonomy. *Psittacus patagonus* Vieillot, 1818, Buenos Aires.

Population of C Chile, formerly known as *byroni*, recently renamed *bloxami*, following the realization that the name *byroni* actually refers to (and is a synonym of) *Enicognathus leptorhynchus*. Four subspecies recognized.

Subspecies and Distribution.

C. p. andinus Dabbene & Lillo, 1913 - NW Argentina.

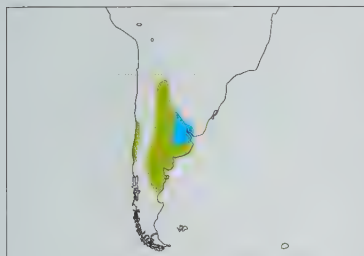
C. p. conlara Nores & Yzurieta, 1983 - San Luis and Córdoba provinces, WC Argentina.

C. p. patagonus (Vieillot, 1818) - C to SE Argentina, ranging occasionally into Uruguay in winter.

C. p. bloxami Olson, 1995 - C Chile.

Descriptive notes. 39-52 cm; 256-303 g. Head to upper back and mid-belly dull olive, with bare white peri- and postocular patch, and a variable but incomplete dirty whitish pectoral band; belly and thighs variably orange red, flanks, upper thighs, vent, lower back and rump yellow; wing-coverts greenish olive, primaries bluish, secondaries and tail olive. Immature like adult with horn-coloured patch on mandible. Race *andinus* duller, olive yellow replacing yellow, pectoral band very indistinct; *conlara* darker on breast; *bloxami* larger with whitish pectoral band wider and more nearly complete, back darker green, but ventral red variable and not diagnostic.

Habitat. Arid lowland and montane grassy shrubland, open dry woodland savanna, open Chaco plains along watercourses, thorny scrub or columnar cacti, often with a sandy substrate, commonly near watercourses, up to 2000 m; also pastures and cultivation, and will enter edges of towns, roosting on wires. Dominant tree species in one study area were *Geoffroea decorticans*, *Prosopis caldenia*, *P. chilensis* and *P. flexuosa*.



Food and Feeding. Seeds taken from the ground, but also from standing vegetation such as the giant thistle *Carduus marianus*, these mostly in winter; berries and fruits such as *Geoffroea decorticans*, *Prosopis*, *Schinus*, *Empetrum rubrum*, *Lycium salsum*, *Discaria* and cacti, mostly in summer. Thus in one study, in terms of percentage of total volume, fruit comprised 2% of crop contents in Nov-Dec, 74% in Jan, 25% in Feb, 35% in Mar, and 8% in Apr.

Breeding. Sept-Feb. Nest in burrow in sandstone, limestone or earth cliff, often by river or sea, sometimes at considerable height; colo-

nial, with burrows often interconnecting. Eggs 2-4; in captivity, incubation timed at 24-25 days, nestling period 8 weeks. In wild, young dependent for several months after leaving nest.

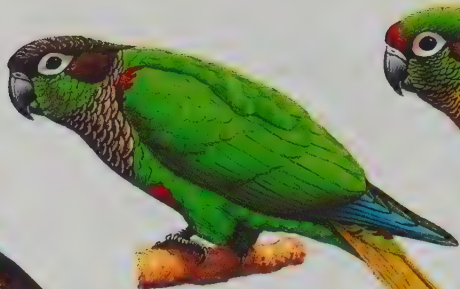
Movements. Austral migrant in S of range, extending N in winter as far as coastal Uruguay. Downslope movements occur in winter in Chile and NW Argentina, and some nomadism may occur.

Status and Conservation. Not globally threatened. CITES II. Formerly very common but now only patchily so, and still declining in part owing to increasing persecution as crop pest (officially declared as such under Argentine law in 1984), and related exploitation for pet trade (pest status excluding it from the country's general 1986 ban on wildlife trade); its colonial nesting habit renders it particularly susceptible to intentional human interference. Up to 1991 export quotas were unlimited, but were set at 9000 in 1992 and 7200 in 1993, the race *andinus* being recommended for exclusion from this exploitation. Race *conlara* abundant within restricted range. Race *bloxami* formerly widespread and abundant, now much reduced in numbers, largely owing to hunting as a feast-day delicacy; by 1983 only 12 nesting sites were known, with 2800 birds in 1984. Hydroelectric damming threatened two of these sites, and translocation efforts with supplementary feeding were being attempted.

Bibliography. Anon. (1993), Brennan (1994), Bucher & Nores (1988), Bucher & Rinaldi (1986), Bucher & Rodríguez (1986), Bucher *et al.* (1987), Canevari *et al.* (1991), Clarke & Clarke (1994), Conway (1965), Fjeldså & Krabbe (1990), Goodland (1987), Hoy (1968), Inskipp *et al.* (1988), Johnson (1967, 1972), Jones (1992), Klimaitis & Moschione (1987), Low (1972, 1995a), Manríquez (1984), Moschione (1992), Narosky & di Giacomo (1993), Nellar (1993), Nores & Yzurieta (1983, 1994), Olrog (1984), Olson (1995), Partridge (1964), de la Peña (1988), Ridgely (1981), Silva (1985), Stotz *et al.* (1996), Wetmore (1926), Whitney (1996), Wilkinson (1991).



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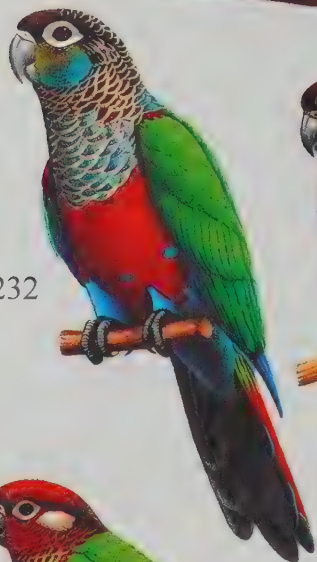


ssp frontalis



231

ssp chiripepe



232



233



ssp molinae

234



ssp restricta



ssp roseifrons



235

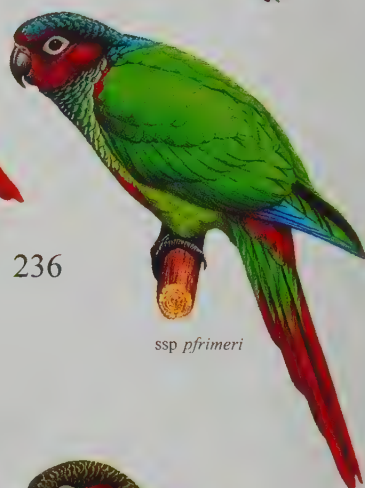
ssp lucianii



ssp griseipectus

ssp emma

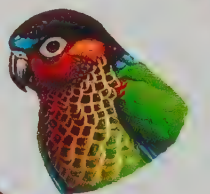
236



ssp pfrimeri



ssp subandina



ssp amazonum

235



ssp picta



237



238

PLATE 49

inches 4
cm 10

Genus *PYRRHURA* Bonaparte, 1856

229. Blue-throated Parakeet

Pyrrhura cruentata

French: Conure tiriba **German:** Blaulatzsittich **Spanish:** Cotorra Tiriba
Other common names: Blue-chested/Ochre-marked/Red-eared/Black-tailed Parakeet/Conure, Blue-throated Conure

Taxonomy. *Psittacus cruentatus*, Wied, 1820, Rio de Janeiro. Monotypic.

Distribution. E Brazil from Bahia to Rio de Janeiro.



Descriptive notes. 30 cm. Crown and nape blackish with buff flecks; lores to ear-coverts orange red, yellower posteriorly; lower cheeks green; breast, sides of neck and thin collar blue; rest of body green but with red on belly, rump and bend of wing, blue in primaries, tail olive green above and brownish red below. Immature duller, less red in wing.

Habitat. Humid primary lowland forest and edge, penetrating small clearings and thinned forest, and tolerating shade plantations, reaching 960 m in some places, though generally below around 400 m.

Food and Feeding. Seeds and fruits of trees commonly at forest edges or in canopy; *Trema micrantha*, *Cecropia*, *Talisia esculenta*, *Alchornea iricurana* and *Mabea fistulifera* have been identified, and *Miconia hypoleuca* important as available in period of general fruit scarcity. Maize reported but not confirmed by observation.

Breeding. Sept-Dec. Nest in hole in tree, once 10 m up. Eggs 2-4; incubation 22-25 days; nestling period 45 days.

Movements. No evidence for any migration; indeed, ability to move between now highly disjunct forest fragments may be negligible.

Status and Conservation. **VULNERABLE.** CITES I. Survives in patches of forest in landscape largely cleared of trees over a century ago, yet even now forest (notably where left to shade understorey plantations in Bahia) is being cleared rapidly, leaving isolated populations stranded in a handful of reserves, those owned publically being: Chapada Diamantina and Monte Pascoal National Parks (Bahia), Rio Doce State Park (Minas Gerais), Córrego Grande, Córrego do Veado and Sooretama Biological Reserves (Espírito Santo).

Bibliography. Beissinger & Snyder (1992), Coimbra-Filho & Aldrichi (1971, 1972), Coimbra-Filho *et al.* (1973), Collar (1986, 1996), Collar & Andrew (1988), Collar, Crosby & Stattersfield (1994), Collar, Gonzaga *et al.* (1992), Descourtiz (1983), Ferris (1996), Forrester (1993), Galetti & Stotz (1996), Gonzaga *et al.* (1987), Harrison & Holyoak (1970), King (1978/79), Low (1972), de Mattos & de Andrade (1988), Moojen *et al.* (1941), Pinto (1935, 1938, 1945a), Ridgely (1981), Scott & Brooke (1985), Sick (1972, 1985, 1993), Spenkelink-van Schaik (1984, 1996), Stotz *et al.* (1996), Tobias *et al.* (1993), Wege & Long (1995), Whitney (1996).

230. Blaze-winged Parakeet

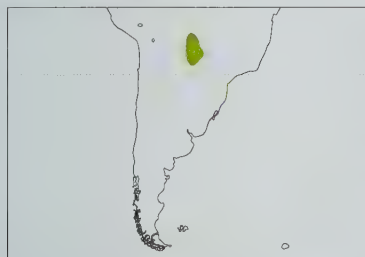
Pyrrhura devillei

French: Conure de Deville **German:** Devillesittich **Spanish:** Cotorra de Deville
Other common names: Blaze-winged Conure

Taxonomy. *Conurus Devillei* Massena and Souancé, 1854, Bolivia (= Paraguay).

Forms a superspecies with *P. frontalis*, and may be conspecific, converging on *P. f. chiripepe*, with which hybridizes in N Paraguay. Monotypic.

Distribution. S Brazil and N Paraguay. The part of Bolivia from which the type specimen came appears now to be in Paraguay.



Descriptive notes. 26 cm. Like *P. frontalis* but crown brownish; bend of wing, carpal edge and lesser underwing-coverts red, and underparts darker. Immature undescribed.

Habitat. Deciduous and gallery woodland in the Pantanal and Chaco regions, ranging into adjacent scrub and savanna, seeming to occupy ecotones.

Food and Feeding. Fruit, seeds and nuts, in one case *Sapium haematospermum*.

Breeding. No information.

Movements. No information.

Status and Conservation. Not globally threatened. CITES II. Although the range is relatively

small, it is remote and little disturbed, although recent development of the Pantanal for ranchland may have reduced some habitat. Birds reportedly remain locally common in Brazil, although rare and uncommon in Paraguay, while trade is apparently minimal.

Bibliography. Hayes (1995), López (1992), Low (1972), Olrog (1968), Pinto (1964), Remsen & Traylor (1989), Ridgely (1981), Short (1975), Sick (1985, 1993), Schubart *et al.* (1965), Stotz *et al.* (1996), Wheatley (1994), Whitney (1996), Zotta (1950).

231. Maroon-bellied Parakeet

Pyrrhura frontalis

French: Conure de Vieillot **German:** Braunoehrsittich **Spanish:** Cotorra Chiripepe

Other common names: Maroon-bellied Conure, Red-bellied/Reddish-bellied Parakeet/Conure

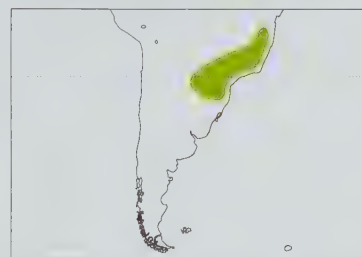
Taxonomy. *Psittacus frontalis* Vieillot, 1818, Cayenne; error, Espírito Santo.

Forms a superspecies with *P. devillei*, with which may be conspecific. Intermediate populations formerly placed in a separate race, *kriegi*. Two subspecies currently recognized.

Subspecies and Distribution.

P. f. frontalis (Vieillot, 1818) - E Brazil from Bahia to Rio de Janeiro and N São Paulo.

P. f. chiripepe (Vieillot, 1818) - SE Brazil, SE Paraguay and N Argentina.



Descriptive notes. 24-28 cm; 72-94 g. Generally green; frontal band rufous; lores black; ear-coverts reddish brown; chin to sides of neck and breast yellowish green edged brown, producing scaled effect; belly maroon; primaries with blue; tail olive green, distal third maroon, undersides dull rufous brown. Immature duller. Race *chiripepe* has no maroon on upper tail, bend of wing usually marked orange red.

Habitat. Range generally follows distribution of *Araucaria*, though link not strict: thus in N of range confined to humid montane evergreen forest, spreading in S into lower-lying areas of forest including drier formations, gallery wood-

land, partly cleared and thinned areas, even some city parks; 0-1400 m.

Food and Feeding. *Araucaria* nuts are a chief food in S Brazil, but also recorded are fruits of *Campomanesia xanthocarpa* and *Podocarpus lamberti*, palm nuts, *Myrciara* fruits, cultivated oranges and persimmons, maize, and homopteran larvae in galls. Detailed study in SE Brazil showed pulp of *Euterpe edulis*, seeds of *Schinus*, *Xylopia*, *Cecropia*, *Alchornea*, *Croton*, *Hieronyma*, *Tetrorchidium*, *Miconia*, *Tibouchina*, *Piptadenia*, *Coussapoa*, *Ficus*, *Myrcia*, *Psidium*, *Pinus*, *Merostachys*, *Solanum*, *Trema*, flowers of *Ambrosia*, *Piptocarpha*, *Vernonia*, *Norantea*, *Eucalyptus*, arils of *Protium*.

Breeding. Oct-Dec in S Brazil. Nest in hole in tree, once only 3 m from ground. Eggs 5; in captivity, incubation around 30 days, nestling period 45 days.

Movements. No information.

Status and Conservation. Not globally threatened. CITES II. In many parts of S Brazil it is one of the commonest parrots, and it is common in Misiones, Argentina, becoming rare at edges of range in Uruguay, and no recent records from Santa Fe, Argentina. In period 1985-1990 29,678 birds were exported from Argentina, which classified the species as an injurious pest, but no export quota was set in 1993 and for some years concern has existed that remaining populations should not suffer further exploitation in the country.

Bibliography. Anon. (1993), Belton (1984), Canevari *et al.* (1991), Contreras *et al.* (1990), Dalborg-Johansen (1954), Darrieu (1983c), Eckelberry (1965), Gore & Gepp (1978), Guix (1995), Hayes (1995), Inskipp *et al.* (1988), Klimaitis & Moschione (1987), López (1992), Low (1972), Martuscelli (1994a), Mitchell (1957), Nores & Yzurieta (1994), de la Peña (1988), Pizo *et al.* (1995), Ridgely (1981), do Rosário (1996), Saibene & Narosky (1983), Short (1975), Sick (1985, 1993), Stotz *et al.* (1996), Vriends (1979), Wetmore (1926), Whitney (1996), Willis & Oniki (1981).

232. Crimson-bellied Parakeet

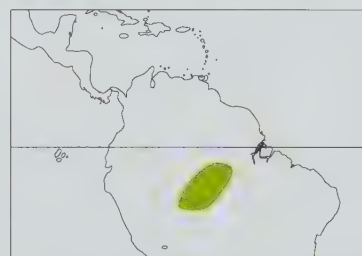
Pyrrhura perlata

French: Conure à ventre rouge **German:** Rotbauchsittich **Spanish:** Cotorra Ventrirroja
Other common names: Crimson-bellied Conure

Taxonomy. *Aratinga perlatus* Spix, 1824, banks of the Amazon.

Forms a parapatric species pair with *P. lepida*, with which sometimes considered conspecific. Complicated situation in which types of name *perlata* have proved to be immatures of the form long known as *P. rhodogaster*, which name thus becomes a junior synonym of *P. perlata*; as a consequence, the form (Pearly Parakeet) until now known as *P. perlata* assumes its own next oldest name, *P. lepida*. Monotypic.

Distribution. Brazil from W Pará and E Amazonas S to CW Mato Grosso, and into N Bolivia.



Descriptive notes. 24 cm; 80-102 g. Head dark brown with buff flecking, bare orbital ring whitish, upper cheek green shading down to blue, ear-coverts flecked buff; sides of neck and upper breast scaled buff on grey; lower breast and belly red; flanks, thighs and vent blue; back and wings green with red shoulder and lesser underwing-coverts, blue in wing-coverts and violet blue in flight-feathers; tail brownish red, terminally blue, grey below. Immature replaces ventral red with green.

Habitat. Humid lowland forest, apparently preferring denser vegetation at forest edge and in secondary growth.

Food and Feeding. Fruits of *Trema micrantha* at forest margins, *Tetragastris altissima*, *Goupia glabra*, *Alchornea discolor*, *Vismea cayennensis*, *Coussapoa trinervis*, *Pourouma minor*, *Pseudolmedia laevis*, *Psidium*, *Cecropia*, *Ficus*, *Eugenia*, *Zanthoxylum*, *Euterpe* palm fruits and *Cecropia* catkins, and flowers and fruit of *Bertholletia excelsa* and *Dioclea glabra*.

Breeding. Jul-Nov in S of range, sometimes later. In captivity: 3-6 eggs; incubation lasting 25 days; and nestling period 7-8 weeks.

Movements. No information.

Status and Conservation. Not globally threatened. CITES II. Earlier this century great flocks were seen in S of range, and it seems likely that its overall status has changed little, despite increasing loss of habitat in the N. Common along Rio Jiparaná, Rondônia.

Bibliography. Anon. (1993), Arndt (1983), Arndt & Roth (1986), Bates *et al.* (1989), Beissinger & Snyder (1992), Collar (1997), Dubs (1992), Forrester (1993), van Hoek & King (1997), Low (1972), Naumburg (1930), Novaes (1976), Olrog (1968), Parker *et al.* (1991), Pinto (1964), Remsen & Traylor (1989), Ridgely (1981), Roth (1984a, 1984b), Sick (1985, 1993), Stotz *et al.* (1996), Wheatley (1994), Whitney (1996).

233. Pearly Parakeet

Pyrrhura lepida

French: Conure perlée **German:** Blausteißittich **Spanish:** Cotorra Pulcra
Other common names: Pearly Conure

Taxonomy. *Sittace lepida* Wagler, 1832, Amazonian Brazil.

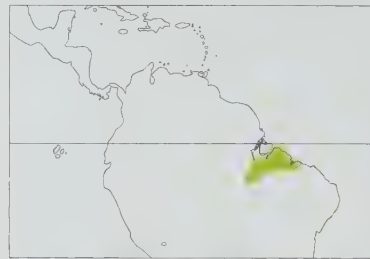
Forms a parapatric species pair with *P. perlata*, with which sometimes considered conspecific. Confused taxonomic history: present species until recently known as *P. perlata*, but as that name is actually applicable to the form long known as *P. rhodogaster*, present species consequently assumes its next oldest name, *P. lepida*. Three subspecies recognized.

Subspecies and Distribution.

P. l. lepida (Wagler, 1832) - NC Brazil, in NE Pará and NW Maranhão.

P. l. anerythra Neumann, 1927 - NC Brazil, in E Pará.

P. l. coerulescens Neumann, 1927 - NC Brazil, in W & C Maranhão.



Descriptive notes. 24 cm; 70-80 g. Head dark brown, slightly mottled buff on nape, bare orbital ring whitish, cheeks dull blue-green, ear-coverts buff; upper breast and sides of neck scaled buff on mid-brown, with some blue suffusion on mid-breast; remaining underparts green with blue suffusion on flanks and thighs; upperparts as *P. perlata*. Immature similar. Race *coerulescens* has paler head, upper breast with stronger blue tinge; *anerythra* lacks blue breast tinge and red in wing, but has red tinge to lower breast and belly.

Habitat. Humid *terra firme* forest, forest edge and secondary growth, sometimes ranging into adjacent clearings.

Food and Feeding. No information, other than vegetable material found in a stomach.

Breeding. No information; a female was in 100% moult in Sept.

Movements. No information.

Status and Conservation. Not globally threatened. CITES II. Range similar to that of *Guarouba guarouba*, so habitat loss has been very serious for this species too, but it occurs at higher densities than *G. guarouba*, is more tolerant of disturbed habitats, and suffers little persecution for trade. Nonetheless, the race *coerulescens* appears to have suffered almost total clearance of habitat and may be approaching extinction, and the other races may also be in increasing difficulties.

Bibliography. Anon. (1993), Arndt & Roth (1986), Clausen (1986), Collar & Andrew (1988), Forrester (1993), Low (1972), Novaes (1969), Olrog (1968), Pinto (1964), Ridgely (1981), Ruschi (1979), Sick (1985, 1993), Stotz *et al.* (1996), Wheatley (1994), Whitney (1996).

234. Green-cheeked Parakeet

Pyrrhura molinae

French: Conure de Molina **German:** Molinasittich **Spanish:** Cotorra de Molina
Other common names: Green-cheeked Conure

Taxonomy. *Conurus molinae* Massena and Souancé, 1854, Bolivia.

Some of listed subspecific variation may be clinal, given size of range and absence of disjunction. Population in valley of R Machariapo, Bolivia, lacking red belly patch, may be a separate race unless flocks of immatures form. Population of W Brazil formerly known as "*P. hypoxantha*" (Yellow-sided Parakeet), but now judged to be xanthistic birds of nominate race. Five subspecies recognized.

Subspecies and Distribution.

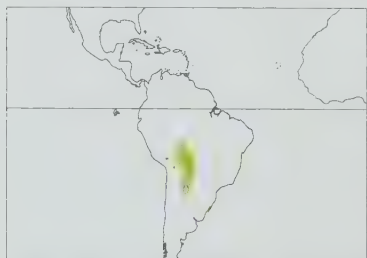
P. m. phoenicura (Schlegel, 1864) - NE Bolivia and W Brazil.

P. m. molinae (Massena & Souancé, 1854) - highland E Bolivia.

P. m. restricta Todd, 1947 - lowland E Bolivia.

P. m. sordida Todd, 1947 - extreme E Bolivia and SW Brazil.

P. m. australis Todd, 1915 - S Bolivia to NW Argentina.



Descriptive notes. 26 cm; 62-81 g. Forehead to nape dull brown; bare orbital ring creamy white; cheeks green; ear-coverts ashy brown; chin, throat and sides of neck scaled brown and whitish, brown and yellow on breast; rest of body green except dull reddish belly, bluish flight-feathers, dull reddish tail. Immature lacks belly patch. Race *phoenicura* has upper tail green basally; *restricta* has blue tinge to cheeks and blue collar, reduced belly patch; *sordida* has less distinct scaling on breast, paler crown; *australis* generally paler, more extensive belly patch.

Habitat. Deciduous lowland woodland, secondary forest, gallery woodland in Pantanal and humid subtropical forest up to 2000 m or more.

Food and Feeding. No information.

Breeding. Feb in Argentina. Nest in hole in tree, in one case 5 m from ground. Eggs 3; in captivity, incubation lasts 22-24 days, with a nestling period of 7 weeks.

Movements. Higher altitude populations descend in autumn and winter, i.e. presumably Mar-Aug. **Status and Conservation.** Not globally threatened. CITES II. Occurrence in N Paraguay still not proven. Common in much of range, and with much habitat remaining. Not widely traded, with only 1345 exported from Argentina in the years 1985-1990 and no quota authorised for 1993.

Bibliography. Babarskas *et al.* (1995), Canevari *et al.* (1991), Collar & Andrew (1988), Darrieu (1980a), Fjeldsø & Krabbe (1990), Harris, F. & Harris (1982), Harris, R. (1994b), Hayes (1995), Hoy (1968), Inskip *et al.* (1988), Low (1972), Merck (1984), Niethammer (1953), Nores & Yzurieta (1994), Orfila (1937), Pearman (1993), de la Peña (1988), Pinto (1964), Remsen & Traylor (1989), Ridgely (1981), Short (1975), Sick (1985, 1993), Smith (1979b), Stotz *et al.* (1996), Whitney (1996), Würth (1997a).

235. Painted Parakeet

Pyrrhura picta

French: Conure versicolore **German:** Rotzügelsittich **Spanish:** Cotorra Pintada

Other common names: Painted Conure

Taxonomy. *Psittacus pictus* P. L. S. Müller, 1776, Cayenne.

Superspecific relations unclear, with strongest relations to *P. leucotis* and *P. melanura*. Some interest in establishing disjunct forms in NW of range as full species, but variation is as great within apparently contiguous "Amazonian" populations; nevertheless, race *eisenmanni* may be closer to *P. leucotis* than to present species, and *eisenmanni* and *caeruleiceps* appear closer to each other than either is to others in the *P. picta*-*P. leucotis* complex. Nine subspecies recognized.

Subspecies and Distribution.

P. p. eisenmanni Delgado, 1985 - Azuero Peninsula, Panama.

P. p. subandina Todd, 1917 - NW Colombia in Sinú Valley.

P. p. caeruleiceps Todd, 1947 - N Colombia on W slope of E Andes.

P. p. pantchenkoi Phelps, 1977 - Colombia-Venezuela border in Sierra de Perijá.

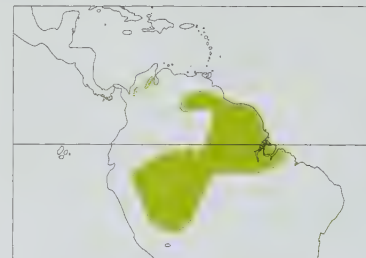
P. p. picta (P. L. S. Müller, 1776) - Venezuela through the Guianas to N Brazil (Amapá).

P. p. amazonum Hellmayr, 1906 - NC Brazil, in Pará N of Amazon.

P. p. microtera Todd, 1947 - NC Brazil S of Amazon from Pará to Tocantins.

P. p. lucianii (Deville, 1851) - NW Brazil, SE Ecuador, NE Peru and along rivers in N Bolivia.

P. p. roseifrons (G. R. Gray, 1859) - W Brazil and E Peru, S and E of previous race.



Descriptive notes. 22 cm; 46-85 g. Forehead to mid-crown blue shading to deep maroon on hindcrown and nape bounded by narrow blue collar; face maroon; bare orbital skin greyish; ear-coverts whitish; sides of neck and breast buff with reddish brown centres to feathers, producing marked scalloped effect; remaining underparts green with dull red belly patch; upperparts green with dull red lower back and rump, red carpal, blue in primaries; tail green basally, maroon distally. Immature lacks red carpal and has whitish orbital ring. Races vary considerably in distribution of colours, with *roseifrons* possessing orange-red head and face

with yellow ear-coverts.

Habitat. Humid *terra firme* forest and edge, seasonally flooded (*várzea*) forest, also coastal sand-ridge and savanna forests, cloud forest in foothills and lower slopes in W Andes, ranging out into partly cleared areas; generally 100-1300 m, with *pantchenkoi* reaching 2000 m. Tends to occupy canopy or lower stages of forest interior more than disturbed edges and second growth.

Food and Feeding. Fruits of *Goupia glabra*, *Bagassa guianensis*, *Trema micrantha*, *Heisteria spruceana*, *Zanthoxylum rhoifolium*, *Cordia*, *Protium*, *Alchornea*, *Drypetes*, *Mimosa*, *Byrsonima*, *Dicella*, *Heteropteris*, *Cecropia*, *Ficus*, *Psidium*, *Pourouma*, *Eugenia* and *Euterpe*, flowers and fruit of *Cochlospermum orinocense* and *Symphonia globulifera*, *Allantoma lineata*, *Bertholletia excelsa*, *Dioclea glabra*, flowers of *Erythrina amazonica*, seeds of *Cecropia miparia* and algae from the surface of deep pools.

Breeding. Jan-Mar in Panama; Mar-Jun in Colombia; Dec-Feb in the Guianas; Jun-Sept in S of range. Nest a hole in a tree. Normally 4-5 eggs in captivity.

Movements. No evidence of any displacements.

Status and Conservation. Not globally threatened. CITES II. Common in flocks inside forest, Guianas. Present in Manu National Park, Peru, where density reaches 4 pairs/km². Races *pantchenkoi* and *eisenmanni* under some stress from habitat loss, and *subandina* possibly now extremely rare for same reason. No serious threat from trade, despite great attractiveness of all races.

Bibliography. Bond & Meyer de Schauensee (1943), Delgado (1985a, 1985b), Desenne (1994), Desenne & Strahl (1991, 1994), Haverschmidt & Mees (1994), Hilty & Brown (1986), Low (1972), Meyer de Schauensee & Phelps (1978), Müller & Neumann (1997), O'Neill (1981), Pinto (1964), Ridgely (1981), Ridgely & Gwynne (1989), Roth (1984a), Schubart *et al.* (1965), Sick (1985, 1993), Smith, G.A. (1982), Snyder (1966), Stotz *et al.* (1996), Terborgh, Fitzpatrick & Emmons (1984), Terborgh, Robinson *et al.* (1990), Tostain *et al.* (1992), Whitney (1996).

236. Maroon-faced Parakeet

Pyrrhura leucotis

French: Conure emma **German:** Weißohrsittich **Spanish:** Cotorra Caripada
Other common names: Maroon-faced Conure, White-eared Parakeet/Conure

Taxonomy. *Psittacus leucotis* Kuhl, 1820, Brazil.

Claimed to form a superspecies with closely related *P. picta*, but interposing ranges unusual in such an arrangement. Proposed race (or even species) "*hypoxantha*" probably based on aberrant specimens of *P. molinae*. Five subspecies recognized.

Subspecies and Distribution.

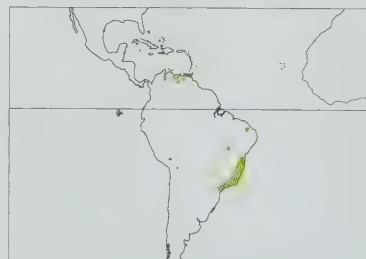
P. l. emma Salvadori, 1891 - NW Venezuela.

P. l. auricularis Zimmer & Phelps, 1949 - NE Venezuela.

P. l. pfrimeri Miranda-Ribeiro, 1920 - C Brazil in Goiás.

P. l. griseipectus Salvadori, 1900 - NE Brazil.

P. l. leucotis (Kuhl, 1820) - E Brazil from Bahia to São Paulo.



Descriptive notes. 23 cm. Crown light brown, bluish on forehead and hindneck; face maroon with whitish ear-coverts; chin, throat, sides of neck and breast green with light buff scaling; underparts green with brownish red patch on belly; upperparts green with brownish red patch from lower back to tail-coverts; carpal area red; primaries with blue; tail brownish red above, duller below. Immature similar. Race *griseipectus* lacks bluish on forehead and replaces green of sides of neck and breast with grey; *pfrimeri* like latter but forehead and ear-coverts chestnut, crown and nape dull blue; *emma* like *leucotis* but blue on hindneck more

extensive, broader buff scaling on breast; *auricularis* similar but larger white ear-coverts.

Habitat. Tropical evergreen and deciduous forest edge, and adjacent clearings with scattered trees and groves, ranging to c. 600 m in Brazil but to 1700 m in Venezuela.

Food and Feeding. Reported to take seeds, fruits, berries, nuts and perhaps insects.

Breeding. No information from the wild. In captivity: 5-9 eggs; incubation, by female only, lasting 27 days; nestling period around 5 weeks.

Movements. Some dispersive movements may occur to and from deciduous habitats, resulting in occasional vagrant records in N Venezuela.

Status and Conservation. Not globally threatened, CITES II. Locally fairly common to abundant in Venezuela, although *auricularis* is suffering from habitat loss. All Brazilian races are under considerable pressure: *pfrimeri* and *griseipectus* are confined to very small areas of unprotected habitat, the latter in the biologically important Serra de Baturité, Ceará, while nominate *leucotis* occupies virtually the same few forest remnants as *P. cruentata*, although extending marginally further S. Trade virtually or actually non-existent.

Bibliography. Brook (1907), Desenne & Strahl (1991, 1994), Forrester (1993), Galetti & Stotz (1996), Harrison & Holyoak (1970), Lever (1987), Low (1972), Meyer de Schauensee & Phelps (1978), Pinto (1964), Restall (1970), Ridgely (1981), Schubart *et al.* (1965), Schubart *et al.* (1965), Sick (1985, 1993), Smith, G.A. (1982), Stotz *et al.* (1996), Vriends (1979), Whitney (1996), Willis (1992).

237. Santa Marta Parakeet

Pyrrhura viridicata

French: Conure des Santa Marta **German:** Santa-Marta-Sittich **Spanish:** Cotorra de Santa Marta
Other common names: Santa Marta Conure

Taxonomy. *Pyrrhura viridicata* Todd, 1913, San Lorenzo, Santa Marta, Colombia. Monotypic.

Distribution. N Colombia in Sierra Nevada de Santa Marta.



Descriptive notes. 25 cm. Generally green, with red frontal band, white bare orbital ring, maroon ear-coverts and flecks on hindneck, broad red band across belly, reddish orange shoulder and primary coverts, blue in primaries and reddish brown on underside of tail. Immature undescribed.

Habitat. Humid montane forest, borders and adjacent clearings, 1800-2800 m.

Food and Feeding. No information.

Breeding. Possibly extended, with evidence for Jun-Nov. Nest in hole in stub. No further information.

Movements. Some seasonal movements occur

within known elevational range.

Status and Conservation. **VULNERABLE.** CITES II. A BirdLife “restricted-range” species. Although judged or assumed throughout 1980’s to be relatively common and secure within the Sierra Nevada de Santa Marta National Park, and with no trade recorded, recent fieldwork has shown that only 15% of the massif’s original habitat remains, with extensive clearance for marijuana growth

compounded by damage caused by herbicides dropped on the marijuana. Within the altitude of the species only 200 km² of habitat remains, and no more than 5000 birds can now survive.

Bibliography. Collar (1996), Collar *et al.* (1994), Fjeldså & Krabbe (1990), Hilty & Brown (1986), Low (1972), Olrog (1968), Ridgely (1981), Stotz *et al.* (1996), Todd & Carriker (1922), Wege & Long (1995), Wheatley (1994), Whitney (1996).

238. Fiery-shouldered Parakeet

Pyrrhura egregia

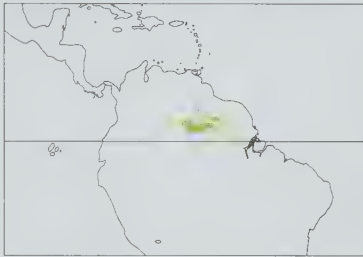
French: Conure aile-de-feu **German:** Feuerbugsittich **Spanish:** Cotorra Egregia
Other common names: Fiery-shouldered Conure

Taxonomy. *Conurus egregius* P. L. Sclater, 1881, “supposed to be from Demerara”. Two subspecies recognized.

Subspecies and Distribution.

P. e. egregia (P. L. Sclater, 1881) - SE Venezuela and adjacent SW Guyana.

P. e. obscura Zimmer & Phelps, 1946 - S Venezuela and adjacent extreme NE Brazil.



Descriptive notes. 25 cm. Generally green; crown and lores brown edged green; ear-coverts reddish brown; sides of neck and breast edged whitish and tipped dark, giving light scaled effect; belly with variable reddish brown patch; bend of wing, carpal edge and lesser underwing-coverts yellow marked orange; flight-feathers with blue; tail above dark reddish brown basally green, grey below. Immature has green crown, less colour in wing. Race *obscura* darker.

Habitat. Tepuí (tabletop) forest and edge, ranging round the bases of these mountains, 700-1800 m.

Food and Feeding. No information.

Breeding. No information.

Movements. No information.

Status and Conservation. Not globally threatened. CITES II. A BirdLife “restricted-range” species. Apparently common, but there is considerable loss of habitat in the range of nominate *egregia* in Venezuela, but not of *obscura*; much of this range in supposedly inside Gran Sabana National Park. Trade is actually or virtually non-existent.

Bibliography. Desenne & Strahl (1991, 1994), Forrester (1993), Low (1972, 1994c), Mayr & Phelps (1967), Meyer de Schauensee & Phelps (1978), Olrog (1968), Pinto (1964, 1966), Ridgely (1981), Sick (1985, 1993), Snyder (1966), Stotz *et al.* (1996), Wheatley (1994), Whitney (1996).



240

ssp sandiae

242

ssp pacifica

ssp berlepschi

ssp rupicola

241

ssp melanura

239

ssp chapmani

243

ssp immarginata

244

245

ssp hoematotis

246

247

248

249

250

251

252

253

255

254

PLATE 50

inches

4

cm

10

239. Maroon-tailed Parakeet

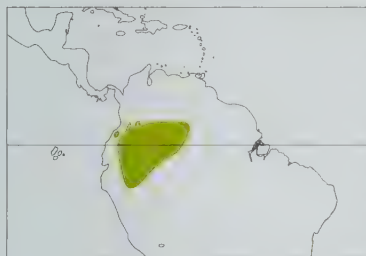
Pyrrhura melanura

French: Conure de Souancé **German:** Braunschwanzsittich **Spanish:** Cotorra Colinegra
Other common names: Maroon-tailed Conure

Taxonomy. *Aratinga melanurus* Spix, 1824, Tabatinga, Rio Solimões, Brazil. Forms a superspecies with *P. orcesi*, but also pairs parapatrically with *P. picta*. Races *pacifica* and *chapmani* are particularly distinctive forms, but the variability in *berlepschi* and *souancei* may overlap, requiring the two to be merged. Five subspecies recognized.

Subspecies and Distribution.

P. m. pacifica Chapman, 1915 - SW Colombia and NW Ecuador.
P. m. chapmani Bond & Meyer de Schauensee, 1940 - E slope of C Andes of Colombia at 1600-2800 m.
P. m. melanura (Spix, 1824) - S Venezuela through NW Brazil to SE Colombia, E Ecuador and NE Peru.
P. m. souancei (J. Verreaux, 1858) - SC Colombia near Macarena Mts.
P. m. berlepschi Salvadori, 1891 - E slope of Andes in SE Ecuador and N Peru.



Descriptive notes. 24-25 cm; 83 g. Generally green; frontal band dark reddish brown; crown and nape brown edged green, bare orbital ring white; throat, sides of neck and breast dark green edged buffy whitish, giving scaled effect; primary coverts red, tipped yellowish orange; outer primaries blue, with narrow green fringe on outer web; tail deep maroon above, green at base, dusky greyish below. Immatures similar to adult. Race *souancei* has more strongly scaled throat, all-red primary coverts, sometimes red on carpals, brownish red belly, and blacker undertail; *berlepschi* has still stronger throat scaling, carpal and belly markings invariably present; *pacifica* lacks white orbital ring and has green forecrown; *chapmani* larger, with breast scaling extending round hindneck, crown more solid brown, less red in wing, and red belly patch.

Habitat. Cloud forest, lowland wet forest in premontane zones, seasonally flooded (*várzea*) forest, borders and partially cleared areas. Generally only to 500 m, though sometimes higher.

Food and Feeding. Poorly documented. Fruits of *Miconia theaezans* and other Melastomataceae recorded, also of *Fagra (Zanthoxylum) tachuelo*, and seeds found in stomachs.

Breeding. Copulation seen in Jan, Colombia; Apr-Jun, E Ecuador. In captivity: 4 eggs; incubation lasting c. 25 days; nestling period 7-8 weeks.

Movements. Seasonal movements have been speculated to account for gaps in records at some sites in Colombia.

Status and Conservation. Not globally threatened. CITES II. Generally fairly common, and in places in S Colombia the most numerous parrot; however, race *pacifica* relatively uncommon. Minimal habitat loss or trade pressure in Venezuela, and indeed virtually no trade anywhere in range.

Bibliography. Davis (1986), Desenne & Strahl (1991, 1994), Dugand & Borrero (1948), Fjeldså & Krabbe (1990), Friedmann (1948b), Hilty & Brown (1986), Inskipp *et al.* (1988), Lehmann (1957), Lemke (1977), Low (1972), Meyer de Schauensee & Phelps (1978), O'Neill (1981), Pearson (1972), Phelps & Phelps (1958), Pinto (1964), Rhodes (1970), Ridgely (1981), Ridgely & Gaulin (1980), Ridgely & Robbins (1988), Sick (1985, 1993), Spenkelink-van Schaik (1980c), Stotz *et al.* (1996), Whitney (1996).

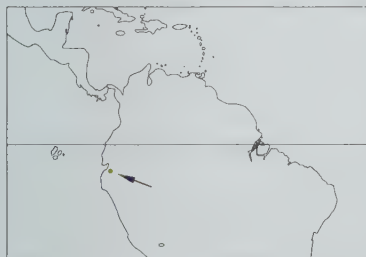
240. El Oro Parakeet

Pyrrhura orcesi

French: Conure d'Orcès **German:** Orcessittich **Spanish:** Cotorra de El Oro
Other common names: El Oro Conure

Taxonomy. *Pyrrhura orcesi* Ridgely and Robbins, 1988, c. 9-5 road km west of Piñas, c. 900 m, 3°40' S, 79°44' W, Province of El Oro, Ecuador. Forms a superspecies with *P. melanura*. Monotypic.

Distribution. SW Ecuador.



Descriptive notes. 22 cm; 65-75 g. Close to *P. melanura* but lores and forehead red, scaled pattern of breast and sides of neck reduced to broad but indistinct greyish buff bars on green, belly variably marked dull reddish, bend of wing red, more blue in primaries, tail green basally, and undertail appears redder (tone similar in *P. melanura chapmani*). Female has red on head reduced to narrow band on forehead. Immature has less red on head and bend of wing, no belly mark.

Habitat. Very humid upper tropical forest, 300-1300 m.

Food and Feeding. Fruits of fig *Ficus* cf. *macbridei*, tiliacean *Heliocarpus popayanensis*, euphorb *Hieronyma*, *Cecropia* and berries.

Breeding. Fledged young being fed Jun and Aug, so breeding may extend from Mar to Jul.

Movements. No information.

Status and Conservation. **VULNERABLE.** CITES II. A BirdLife "restricted-range" species. Population estimated to lie between 2000 and 20,000 birds, under pressure from continuing habitat clearance for ranchland. No protected area holds a population of this bird; the type locality at Hacienda Buenaventura possesses some 1000 ha of forest whose formal protection is still being negotiated.

Bibliography. Beissinger & Snyder (1992), Best & Clarke (1991), Best & Kessler (1995), Best, Checker *et al.* (1996), Best, Clarke *et al.* (1993), Bloch *et al.* (1991), Collar (1996), Collar, Crosby & Stattersfield (1994), Collar,

Gonzaga *et al.* (1992), Ortiz & Carrión (1991), Ridgely & Robbins (1988), Shuker (1993), Stotz *et al.* (1996), Vuilleumier *et al.* (1992), Wege & Long (1995), Wheatley (1994), Whitney (1996), Williams & Tobias (1994).

241. Black-capped Parakeet

Pyrrhura rupicola

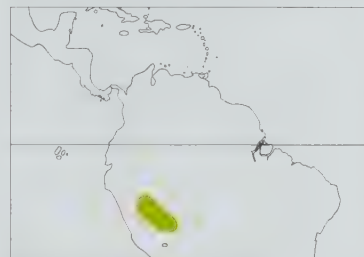
French: Conure à cape noire **German:** Schwarzkappensittich **Spanish:** Cotorra Capirotada
Other common names: Black-capped Conure, Rock Parakeet/Conure

Taxonomy. *Conurus rupicola* Tschudi, 1844, Peru.

An apparent hybrid of present species with *P. molinae* has been taken in SE Peru, indicating these forms possibly conspecific, but substantial differences remain. Both describers of race *sandiae* were evidently sceptical of its distinctness. Two subspecies tentatively recognized.

Subspecies and Distribution.

P. r. rupicola (Tschudi, 1844) - C Peru.
P. r. sandiae Bond & Meyer de Schauensee, 1944 - SE Peru, extreme W Brazil and N Bolivia.



Descriptive notes. 25 cm; 75 g. Forehead to nape dusky brown, with whitish edges to hindneck; bare orbital ring white, face and ear-coverts green; sides of neck, throat and breast buff-white with dark brown centres to feathers, producing marked scalloped effect; rest of body green but carpals and primary coverts red, primaries with slight blue tinge, underside of tail greyish brown. Immature lacks red in wing. Race *sandiae* has narrower scalloping.

Habitat. Humid lowland *terra firme* and seasonally flooded *várzea* forest and edge, ranging into foothills of Andes.

Food and Feeding. No information.

Breeding. Copulation seen in Sept. In captivity up to 7 eggs.

Movements. No information.

Status and Conservation. Not globally threatened. CITES II. A BirdLife "restricted-range" species. Fairly common, with much still pristine habitat within range and apparently no trade pressure, so numbers presumed stable; it is common in Manu National Park, where density reaches 3-5 pairs/km².

Bibliography. Allen (1995), Bond (1955), Glogowsky (1994), Low (1972), O'Neill (1974, 1981), Olog (1968), Parker *et al.* (1982), Pinto (1964), Remsen & Traylor (1989), Ridgely (1981), Sick (1979c, 1985, 1993), Stotz *et al.* (1996), Terborgh, Fitzpatrick & Emmons (1984), Terborgh, Robinson *et al.* (1990), Wheatley (1994), Whitney (1996).

242. White-necked Parakeet

Pyrrhura albipectus

French: Conure à col blanc **German:** Weißhalsstittich **Spanish:** Cotorra Cuelliblanca
Other common names: White-necked Conure, White-breasted Parakeet/Conure

Taxonomy. *Pyrrhura albipectus* Chapman, 1914, Zamora, 3000 feet (c. 1000 m), Loja, Ecuador. Possible hybrids with *P. melanura berlepschi* in Cordillera de Cutucú suggest present species may eventually be regarded as a race of *P. melanura*. Monotypic.

Distribution. SE Ecuador.



Descriptive notes. 24 cm; 83-110 g. Very thin dark reddish brown frontal band, with forehead to hindcrown brownish edged grey, more so towards rear, and white bare orbital ring; cheeks green with yellow scaling, and orange auricular spot; full broad white collar; yellow breast, rusty tone on belly; rest green with primary coverts red, primaries deep bluish; distal half of uppertail dull reddish; undertail dusky with rufescent tipping in fresh plumage. Immature lacks frontal band and has paler auricular spot, white breast.

Habitat. Primary upper tropical and subtropical forest, edge and clearings at 900-2000 m.

Food and Feeding. Fruits of *Tetrorchidium macrophyllum*, *Alchornea glandulosa*, *Miconia* cf. *punctata*, *Ficus* aff. *mutisii*, seeds of *Mollia grandis* and flowers of the vines *Mikania leiostachya* and *Piptocarpha* cf. *poepigiana*, the latter taken low in vegetation.

Breeding. May-Jul. No further information.

Movements. No information.

Status and Conservation. **VULNERABLE.** CITES II. A BirdLife "restricted-range" species. The species appears to be uncommon, and the total population may only be a few thousand birds. Forests at the species's elevation are under great pressure, and even Podocarpus National Park, one of the four sites known for the species, has a chequered history of mining concession agreements and local clearance; the Cordillera de Cutucú, another site, is a Shuar Indian reserve, but to claim land the Shuars have to clear at least part of it. The species may, however, be found in N Peru and prove rather more secure than it appears at present. Minor local trade may exist.

Bibliography. Beissinger & Snyder (1992), Bloch *et al.* (1991), Butler (1979), Chapman (1926), Collar (1996), Collar & Andrew (1988), Collar, Crosby & Stattersfield (1994), Collar, Gonzaga *et al.* (1992), Krabbe & Sornoza (1994), Low (1972), Ortiz & Carrión (1991), Rasmussen *et al.* (1996), Ridgely (1981), Robbins *et al.* (1987), Stotz *et al.* (1996), Toyné & Jeffcote (1992), Toyné *et al.* (1992), Wege & Long (1995), Whitney (1996), Williams & Tobias (1994).

On following pages: 243. Brown-breasted Parakeet (*Pyrrhura calliptera*); 244. Red-eared Parakeet (*Pyrrhura hoematotis*); 245. Rose-headed Parakeet (*Pyrrhura rhodoccephala*); 246. Sulphur-winged Parakeet (*Pyrrhura hoffmanni*); 247. Austral Parakeet (*Enicognathus ferrugineus*); 248. Slender-billed Parakeet (*Enicognathus leptorhynchus*); 249. Monk Parakeet (*Myiopsitta monachus*); 250. Cliff Parakeet (*Myiopsitta luchi*); 251. Grey-hooded Parakeet (*Psilopsiagon aymara*); 252. Mountain Parakeet (*Psilopsiagon aurifrons*); 253. Barred Parakeet (*Bolborhynchus lineola*); 254. Andean Parakeet (*Bolborhynchus orbynesius*); 255. Rufous-fronted Parakeet (*Bolborhynchus ferrugineifrons*).

243. Brown-breasted Parakeet

Pyrrhura calliptera

French: Conure à poitrine brune **German:** Braunbrustsittich **Spanish:** Cotorra Pechiparda
Other common names: Flame-winged/Brown-backed Parakeet/Conure, Brown-breasted Conure

Taxonomy. *Conurus callipterus* Massena and Souancé, 1854, Colombia.
Monotypic.

Distribution. E Andes of Colombia.



Descriptive notes. 22-23 cm. Crown and nape brown with green fringing; face green with dusky markings, bare orbital ring white; ear-coverts deep reddish brown; breast and sides of neck mid-brown lightly barred buff; underparts green with reddish brown on belly; upperparts green with carpal edge and primary coverts yellow often with some orange, primaries blue; tail reddish brown. Immature lacks yellow in wing.

Habitat. Cloud forest edge, elfin woodland, second growth and shrubbery with interspersed areas of subpáramo, peatbog páramo and man-made clearings, 1700–3400 m.

Food and Feeding. Blueberries, blackberries *Rubus*, fruit of *Clusia*, *Ficus* and *Brunellia colombiana*, seeds of *Espeletia uribei* and *Cecropia*, and cultivated maize.

Breeding. Aug-Oct. No further information.

Movements. No information.

Status and Conservation. VULNERABLE. CITES II. A BirdLife “restricted-range” species. Apparently extinct on the entire W slope of the E Andes (no records since 1913, when it was common) owing to habitat loss, with a steep decline throughout Cundinamarca, although much habitat still remains in Boyacá. No international trade and only light pressure for local trade; birds are persecuted to defend maize crops, and this problem will intensify with further deforestation for farming. Present in Chingaza National Park and adjacent protected areas (Río Blanco Forest Reserve, Carpanta Biological Reserve).

Bibliography. Beissinger & Snyder (1992), Chapman (1917), Collar (1996), Collar & Andrew (1988), Collar, Crosby & Stattersfield (1994), Collar, Gonzaga *et al.* (1992), Fjeldså & Krabbe (1990), Hilty & Brown (1986), Low (1972), Olivares (1969, 1971), Olog (1968), Orejuela (1985), Ridgely (1981), Rodríguez & Hernández (1988), Stotz *et al.* (1996), Wege & Long (1995), Whitney (1996).

244. Red-eared Parakeet

Pyrrhura hoematotis

French: Conure à oreillons **German:** Blutohrsittich **Spanish:** Cotorra Colirroja
Other common names: Red-breasted/Blood-eared Parakeet/Conure, Red-eared Conure

Taxonomy. *Pyrrhura hoematotis* Souancé, 1857, Venezuela.
Two subspecies recognized.

Subspecies and Distribution.

P. h. immarginata Zimmer & Phelps, 1944 - NW Venezuela.

P. h. hoematotis Souancé, 1857 - N Venezuela.



Descriptive notes. 25 cm; 64-74 g. Generally green; forehead to mid-crown slaty, bare orbital ring white; ear-coverts bright terracotta; nape edged yellow; sides of neck greyish finely edged white; throat and upper breast lightly scaled greyish; belly with variable reddish brown; undertail-coverts bluish green; primaries with blue; tail brownish red, extreme tips green, coppery below. Immature undescribed. Race *immarginata* lacks pattern on side of neck, dark crown and yellow edges to nape.

Habitat. Cloud forest, savanna woodland, edges and clearings with scattered trees in coastal mountains, mostly at 1000-2000 m,

entering semi-deciduous forest at lower levels in the dry season.

Food and Feeding. Little information. Fruit, including cultivated *Psidium guajava*, blossoms, and the petioles of certain broad leaves, possibly for insect larvae.

Breeding. Aug (wet season). No further information.

Movements. Dry season movements occur to lower levels.

Status and Conservation. Not globally threatened. CITES II. A BirdLife “restricted-range” species. Common within its small range, especially in Henri Pittier National Park, with flocks of over 100 frequent. However, there is steady loss of habitat, especially at the only locality known for race *immarginata*. Little sought after in trade.

Bibliography. Beebe (1947), Desenne & Strahl (1991, 1994), Fernández-Badillo *et al.* (1994), Low (1972), Meyer de Schauensee & Phelps (1978), Ridgely (1981), Schäfer & Phelps (1954), Stotz *et al.* (1996), Wheatley (1994), Whitney (1996), Zimmer & Phelps (1944).

245. Rose-headed Parakeet

Pyrrhura rholocephala

French: Conure tête-de-feu **German:** Rotkopfsittich **Spanish:** Cotorra Coronirroja
Other common names: Rose-headed Conure, Rose-crowned Parakeet/Conure

Taxonomy. *Conurus rholocephalus* P. L. Sclater and Salvin, 1871, vicinity of Mérida, Venezuela.
Monotypic.

Distribution. W Venezuela.

Descriptive notes. 24-25 cm. Forehead to nape red, ear-coverts light maroon; bare orbital ring white; face and sides of neck green, shading to vaguely brown-barred green on underparts; upperparts green with yellow carpal edge, white primary coverts and blue in primaries; tail reddish brown, dusky below. Immature lacks red in crown.



report of serious decline appears to be based on misreading. Little trade recorded.

Bibliography. Arndt (1988), Collar *et al.* (1994), Desenne & Strahl (1991, 1994), Fjeldså & Krabbe (1990), Low (1972), Meyer de Schauensee & Phelps (1978), Olog (1968), Ridgely (1981), Stotz *et al.* (1996), Wheatley (1994), Whitney (1996).

246. Sulphur-winged Parakeet

Pyrrhura hoffmanni

French: Conure de Hoffmann **German:** Hoffmannsittich **Spanish:** Cotorra Catana
Other common names: Hoffmann's Parakeet/Conure, Sulphur-winged Conure

Taxonomy. *Conurus hoffmanni* Cabanis, 1861, Costa Rica.
Two subspecies recognized.

Subspecies and Distribution.

P. h. hoffmanni (Cabanis, 1861) - Costa Rica.

P. h. gaudens Bangs, 1906 - W Panama.



Descriptive notes. 23-24 cm; mean 82 g. Generally green; head, nape and throat variably marked with yellow, breast with dull orange; bare orbital ring white; ear-coverts bright terracotta; primary coverts and basal two-thirds of inner primaries and outer secondaries yellow; primaries with blue; tail rufous olive above fringed green, reddish brown below. Immature has duller scaling, less orange, and much less yellow on wing. Race *gaudens* has head with variable orange red markings, underparts slightly darker.

Habitat. Broken mountainous country in primary and logged forest and edge, adjacent shrubbery and second growth, with an apparent preference for partly cleared pasture; 700-3000 m.

Food and Feeding. Seeds, fruits of *Ficus*, *Croton*, *Myrtis*, *Miconia* and *Leandra subseriata*, sometimes making daily elevational movements from upper roosting areas.

Breeding. Probably mainly Jan-Jun. Nest in old woodpecker hole or hollow broken stub, 8-20 m up. In captivity: 6 eggs; incubation 24 days; nestling period 10 weeks.

Movements. In dry season regularly present up to 3000 m, descending in wet season to 1300 or even 700 m at least on daily visits; once near sea-level.

Status and Conservation. Not globally threatened. CITES II. A BirdLife “restricted-range” species. Fairly common to common within its small range, and tolerant of substantial habitat modification. Very little trade.

Bibliography. Anon. (1983), Blake (1958), Hernández-Baños *et al.* (1995), Leck & Hilty (1968), Low (1972), Orians (1969), Ridgely (1981), Ridgely & Gwynne (1989), Rowley (1985), Slud (1964), Stiles & Skutch (1989), Stotz *et al.* (1996), Taylor, K. (1993), Wetmore (1968), Whitney (1996), Wolf (1976).

Genus ENICOGNATHUS G. R. Gray, 1840

247. Austral Parakeet

Enicognathus ferrugineus

French: Conure magellanique **German:** Smaragdsittich **Spanish:** Cotorra Cachaña
Other common names: Austral Conure

Taxonomy. *Psittacus ferrugineus* P. L. S. Müller, 1776, Straits of Magellan.

Formerly placed in a separate monospecific genus, *Microsittace*. Racial differences may be clinal. Two subspecies currently recognized.

Subspecies and Distribution.

E. f. minor (Chapman, 1919) - S Chile and SW Argentina.

E. f. ferrugineus (P. L. S. Müller, 1776) - extreme S of both Chile and Argentina.

Descriptive notes. 28-36 cm. Dull green, yellower on underparts, with light scaled effect given by dark feather edging; forehead and lores, belly patch and tail dull reddish; primaries with bluish green. Immature has duller reddish on head and belly. Race *minor* smaller and darker.

Habitat. Southern temperate beech *Nothofagus* forest, *Quercus-Drymis* woodlands, and adjacent semi-open areas, including ranchland and at times cultivations; to sea-level in S of range, up to 1200 or even 2000 m in N.

Food and Feeding. Seeds of grasses and the bamboo *Chusquea quila*, seeds of *Araucaria araucana*, acorns, leaf buds of *Nothofagus* and poplars, fruits, berries and bulbous roots.

Breeding. Dec. Nest in hole in tree, commonly large dead oaks; reportedly also makes own nest of twigs or grass stems in *Chusquea*. Eggs 4-8; incubation in captivity timed at c. 26 days.

Movements. Resident in S of range, despite severity of winter; in N downslope movements in winter (Argentine birds ranging into Chile), extent and timing variable with year and thought related to weather and food availability.



Status and Conservation. Not globally threatened. CITES II. Common throughout range, with much suitable habitat inside protected areas in both Chile (e.g. Villarica National Park) and Argentina (e.g. Nahuel Huapi National Park). Very uncommon in captivity. Can cause damage to crops in lowlands in winter.

Bibliography. Araya & Chester (1993), Bernath (1965), Canevari *et al.* (1991), Clark (1986), Darrieu (1982), Fjeldsá & Krabbe (1990), Housse (1949), Humphrey *et al.* (1970), Ireland & McGee (1981), Johansen (1966), Johnson (1967), Low (1972), Nores & Yzurieta (1994), Olrog (1948, 1984), de la Peña (1988), Peters & Blake (1948), Ridgely (1981),

Spenkelink-van Schaik (1980b), Stotz *et al.* (1996), Vuilleumier (1985), Whitney (1996).

248. Slender-billed Parakeet

Enicognathus leptorhynchus

French: Conure à long bec **German:** Langschnabelsittich **Spanish:** Cotorra Choroy
Other common names: Slender-billed Conure

Taxonomy. *Psittacara leptorhyncha* King, 1831, Chiloé Island. Monotypic.

Distribution. C Chile.



Descriptive notes. 40 cm. Very similar to *E. ferrugineus* but larger and somewhat chunkier; lacks scaled effect on undersides, and has brighter, more extensive reddish on forehead; upper mandible greatly elongated. Immature darker green, skin around eye whitish.

Habitat. Southern temperate *Nothofagus* and *Araucaria* forests, ranging sometimes (notably in winter) into semi-open farming areas and pastures. Up to 2000 m in summer.

Food and Feeding. Buds, berries, grass and thistle seeds, but notably *Araucaria* seeds in autumn (Mar-Apr) and *Nothofagus* seeds at other times; feeds both in trees and on ground,

where uses bill to dig up bulbous roots. Can cause damage in crops and apple orchards.

Breeding. Nov-Dec. Nest in hole in tree (often several pairs in one tree), the birds dropping dry twigs into deep holes to raise the floor; occasionally rock crevices are used, and like *E. ferrugineus* birds are reported to construct twig nests in *Chusquea* bamboo if no apertures available. Eggs 2-6.

Movements. Elevational displacements occur in winter to lower levels, May-Sept.

Status and Conservation. Not globally threatened. CITES II. Currently considered near-threatened. A BirdLife "restricted-range" species. Decline in 1950's and 1960's owing to forest clearance, hunting and Newcastle disease, but still fairly common locally, and highly gregarious (up to 2000 in roosts at least formerly) throughout year; considered the most serious agricultural pest on Chiloé I.

Bibliography. Araya & Chester (1993), Fjeldsá & Krabbe (1990), Green (1993), Housse (1949), Johnson (1967), Low (1972), Olrog (1968), Olson (1995), Peters & Blake (1948), Ridgely (1981), Sick (1968), Silva (1980a), Stotz *et al.* (1996), Vuilleumier (1985), Wheatley (1994), Whitney (1996).

Genus MYIOPSITTA Bonaparte, 1854

249. Monk Parakeet

Myiopsitta monachus

French: Conure veuve **German:** Mönchsittich **Spanish:** Cotorra Argentina
Other common names: Quaker/Grey-breasted Parakeet

Taxonomy. *Psittacus monachus* Boddaert, 1783, Montevideo, Uruguay.

Forms superspecies with *M. luchsii*, with which commonly considered conspecific. Three subspecies recognized.

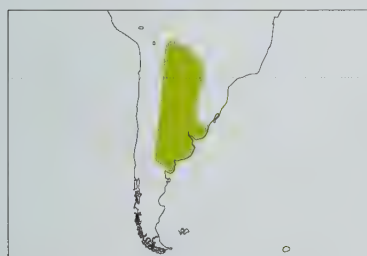
Subspecies and Distribution.

M. m. cotorra (Vieillot, 1818) - S Bolivia, Paraguay, S Brazil and NW Argentina.

M. m. monachus (Boddaert, 1783) - SE Brazil, Uruguay and NE Argentina.

M. m. calita (Jardine & Selby, 1830) - W Argentina.

Introduced to many areas, especially in North America and Europe.



Descriptive notes. 28-29 cm; 90-140 g. Forehead, lores, lower cheek and chin light grey; rest of head green, browner green on mantle and duller on wings, primaries and secondaries deep blue on outer webs; lower back, rump and upperwing-coverts yellowish green; tail green with blue staining along feather shafts; breast brownish broadly edged light grey, creating scaled effect; broad yellowish olive band across belly; lower belly, thighs and vent yellowish green. Immature has forehead tinged green. Race *calita* smaller, head darker grey; *cotorra* like previous race but brighter green, belly less yellowish.

Habitat. Dry semi-open lowlands, generally to 1000 m, in gallery forest, savanna woodland, dry *Acacia* scrubland, xerophytic thickets, palm groves, woodlots, ranchland and orchards, especially near human habitation, also city parks and wooded suburban areas.

Food and Feeding. Seeds of grasses, herbs and various trees, especially *Celtis tala* and palm nuts, with thistles very important in breeding season; also fruits, berries, leaf buds, blossoms and insects. Serious pest of maize, sorghum and other cereals, plus sunflowers, peaches, pears and citrus crops.

Breeding. Oct-Feb. Communal nester. Builds conspicuous enclosed nests of sticks cut with bill, commonly from spiny *Celtis* bushes; nests often with several chambers, and sometimes many; sometimes solitary, but usually occupied (throughout the year) by different pairs and non-breeding individuals; highest available site preferred, hence nests placed in the tops of trees, notably introduced eucalypts, but also on pylons and windmills. Eggs 1-11 (fledging success greatest with around 7 eggs); incubation 24 days; nestling period in captivity c. 6 weeks. Higher productivity noted in eucalypts than in native vegetation; productivity generally amongst highest in psittacids owing to relatively high clutch size.

Movements. Apparently sedentary except at the edges of its range, where presence may be seasonal.

Status and Conservation. Not globally threatened. CITES II. Common to abundant throughout its range, and has increased with the spread of settlements (now encroaching into the *pampas* where eucalypts are planted), so that often now regarded as a major pest. From 1985 to 1989, 82,442 birds were exported from Argentina, and the export quota in 1993 was 24,000, regarded as high. Steadily expanding range and numbers in North America and Europe, with some concern that it will become a serious crop pest.

Bibliography. Aramburú (1991, 1995, 1996), van Bael & Pruett-Jones (1996), Belton (1984), Bucher & Martin (1987), Bucher & Nores (1988), Bucher *et al.* (1991), Caccamise (1980), Caccamise & Weathers (1977), Canevari *et al.* (1991), Contreras *et al.* (1990), Conway (1965), Dahlem (1994), Darrieu (1980b, 1981), Eberhard (1996), Eisenraut (1935), Fallavena & Silva (1988), Fjeldsá & Krabbe (1990), Gore & Gepp (1978), Hayes (1995), Humphrey & Peterson (1978), Hyman & Pruett-Jones (1995), Klimaitis & Moschione (1987), Lever (1987), Low (1972), Marone *et al.* (1992), Martella & Bucher (1990, 1993), Martella *et al.* (1985), Martín (1989), Martín & Bucher (1993), Naumburg (1930), Navarro (1988), Navarro & Bucher (1990, 1992), Navarro, Martella & Bucher (1992, 1995), Navarro, Martín & Bucher (1992), Neidermyer & Hickey (1977), Nores & Yzurieta (1994), de la Peña (1988, 1996), Ridgely (1981), Short (1975), Sick (1985, 1993), Sol *et al.* (1997), Spano & Truffi (1986), Spreyer (1994), Steinbacher (1962), Stotz *et al.* (1996), Vriends (1979), Wetmore (1926), Whitney (1996).

250. Cliff Parakeet

Myiopsitta luchsii

French: Conure des rochers **German:** Luchssittich **Spanish:** Cotorra Boliviana

Taxonomy. *Bolborrhynchus Luchsii* Finsch, 1868, Bolivia.

Usually treated as conspecific with *M. monachus*, but perhaps more appropriately related as forming a superspecies, given marked morphological differences and cliff-nesting habit. Monotypic.

Distribution. C Bolivia.



Descriptive notes. 26-28 cm. Similar to *M. monachus* but grey of forehead whiter and extending to mid-crown, pale grey on breast lacks scaly effect of darker feather-centres, band across belly more yellowish; outer webs of primaries all blue. Immature undescribed.

Habitat. Xerophytic vegetation and adjacent cliff areas near water in intermontane valleys, at 1300-3000 m, the bird's range being largely coincident with *Ara rubrogenys*.

Food and Feeding. Seeds of various fruit (never the same as those taken by *A. rubrogenys*), including those of carapari cacti *Neocardenasia herzogiana* and *Acacia furcatispina*; also cultivated maize.

Breeding. Dec-Mar. Bulky nest constructed of twigs packed into crevices in cliffs; also apparently amongst leaves of cliff-hanging bromeliads. Nests are non-communal but often immediately adjacent. Eggs unknown.

Movements. No information.

Status and Conservation. Not globally threatened. CITES II (under *M. monachus*). Rather common but localized; some young are taken for local trade. No serious persecution despite attacks on maize.

Bibliography. Bond & Meyer de Schauensee (1943), Fjeldsá (1987), Fjeldsá & Krabbe (1990), Lanning (1991b), Low (1972), Ridgely (1981), Short (1975), Stotz *et al.* (1996), Whitney (1996).

Genus PSILOPSIAGON Ridgway, 1912

251. Grey-hooded Parakeet

Psilopsiagon aymara

French: Toui aymara **German:** Aymarassittich **Spanish:** Catita Aimará
Other common names: Aymara/Sierra/Grey-headed Parakeet

Taxonomy. *Arara aymara* d'Orbigny, 1839, Quebrada de Palca, Tacna, Chile; error = *Sicasica*, south of La Paz, Bolivia.

Often placed in genus *Bolborrhynchus*; in past in genus *Amoropsittaca*. Monotypic.

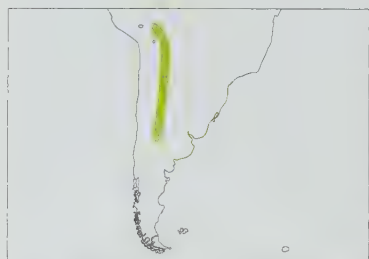
Distribution. NC Bolivia to NW Argentina.

Descriptive notes. 18-20 cm; 45-62 g. Dark greyish brown head and nape; lower cheek, throat, breast and belly pale silvery grey, flanks yellowish green, vent and undertail-coverts bluish green; upperparts green, darker on wings and tail. Female slightly paler on crown, less silvery grey on breast. Immature has shorter tail.

Habitat. Arid to semi-humid montane scrub, often in dense shrubbery and commonly in agricultural land, generally at 1800-3000 m, although both higher and lower than this.

Food and Feeding. Seeding grass, herbs (e.g. *Viguera* and other composites) and berries on bushes.

Breeding. Nov and Jan, in Argentina. Nest in hole in bank, or deserted building; even in cactus, and in the only case recorded up to 5 pairs were using one plant. Eggs 4-6, and up to 12 in captivity, where incubation lasts c. 28 days and the nestling period is 6-7 weeks.



(1988), Remsen & Traylor (1989), Ridgely (1981), Salvador & Narosky (1984), Stotz *et al.* (1996), Wetmore (1926), Wheatley (1994), Whitney (1996).

252. Mountain Parakeet

Psilopsiagon aurifrons

French: Toui à bandeau jaune **German:** Zitronensittich **Spanish:** Catita Frentidorada
Other common names: Golden-fronted Parakeet

Taxonomy. *Psittacus* (*Lathamus*) *aurifrons* Lesson, 1830, New Zealand; error = Peru. Often placed in genus *Bolborhynchus*. Four subspecies recognized.

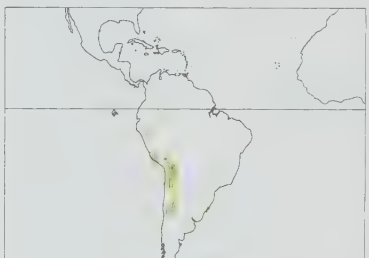
Subspecies and Distribution.

P. a. robertsi Carriker, 1933 - NW Peru.

P. a. aurifrons (Lesson, 1830) - C Peru.

P. a. margaritae (Berlioz & Dorst, 1956) - S Peru and CW Bolivia to N Chile and extreme NW Argentina.

P. a. rubrirostris (Burmeister, 1860) - NW Argentina to C Chile.



Descriptive notes. 16-19 cm; 45 g. Green above from crown to wings and tail, with outer webs of flight-feathers blue; area around bill to eye yellow, extending down throat to merge into greenish yellow underparts; cheeks emerald green. Female lacks yellow around bill, and yellow elsewhere less pronounced. Immature like female. Race *robertsi* lacks yellowish wash in underparts; *margaritae* has shorter tail, and both sexes like nominate female, but bill grey; *rubrirostris* has bluer green upperparts, bluish grey wash on forehead and underparts, and bill flesh pink in male but grey in female.

Habitat. Riparian thickets, wooded and shrubby places with fog vegetation, slopes with composite brush, thorny scrub, *puna* cacti, sometimes even *puna* grassland with scattered bushes; often in gardens, cultivations and even city parks. Nominative *aurifrons* generally occurs at 1000-2900 m, although both higher and lower, along the arid coastal plain; *margaritae* at 3000-4500 m; *rubrirostris* at c. 2500 m.

Food and Feeding. In *puna* zone, buds and seeds of *Lepidophyllum*, *Fabiana densa* and *Adesmia* and other leguminous scrub, taken on bushes and from ground.

Breeding. Feb-Mar in Argentina; Oct-Dec in N Chile. Nest in burrow in dry riverbank, steep cliff or canyon. Eggs 3-6, in captivity up to 7; incubation, by female, possibly 23 days; nestling period reportedly 8 weeks.

Movements. Altitudinal migrant, moving to lower levels in winter.

Status and Conservation. Not globally threatened. CITES II. Common to locally abundant, although race *robertsi* appears to remain virtually unknown. Trade is slight.

Bibliography. Araya & Chester (1993), Canevari *et al.* (1991), Dorst (1956), Fjeldså & Krabbe (1990), Hoppe (1997c), Housse (1949), Hughes (1970), Johnson (1967), Koepcke (1970), Lönnberg (1903), Low (1972), Nellar (1993), Nores & Yzurieta (1994), O'Neill (1981), Peña (1961), de la Peña (1988), Remsen & Traylor (1989), Ridgely (1981), Salvador & Narosky (1984), Spenkelink-van Schaik (1981), Stotz *et al.* (1996), Whitney (1996), Zimmer (1930).

Genus *BOLBORHYNCHUS* Bonaparte, 1857

253. Barred Parakeet

Bolborhynchus lineola

French: Toui catherine **German:** Katharinasittich **Spanish:** Catita Barrada

Taxonomy. *Psittacula lineola* Cassin, 1853, "National Bridge, Mexico" = Puente Nacional, Veracruz. Two subspecies recognized.

Subspecies and Distribution.

B. l. lineola (Cassin, 1853) - S Mexico to W Panama.

B. l. tigrinus (Souancé, 1856) - N & W Venezuela patchily S to C Peru.

Descriptive notes. 16-18 cm; 42-59 g. Green in various shades throughout, bluish on forecrown, more olive on back, yellower below, with deeper olive wing-coverts and bottle green black-tipped flight-feathers and tail; indistinct dark barring from mid-crown to flanks and rump, becoming spots on uppertail-coverts; several broad bars on wings; bend of wing black. Female has lighter barring. Immature paler, barring less distinct, more bluish tinge to head. Race *tigrinus* more strongly barred.

Habitat. Humid evergreen and pine-evergreen cloud-forest groves, second growth and clearings; *tigrinus* especially where landslides have opened land for bamboo; 600-2400 m in Central America, 1600-3300 m in Peru.

Movements. Some altitudinal variation with season, higher in summer.

Status and Conservation. Not globally threatened. CITES II. Fairly common throughout most of its range. Well adapted to life in long established and intensively managed farmland. Traded in moderate numbers in mid-1980's, smaller numbers recently, without apparent effect.

Bibliography. Babarskas *et al.* (1995), Beckett (1964), Canevari *et al.* (1991), Fjeldså & Krabbe (1990), Inskipp *et al.* (1988), Johnson (1967), Low (1972), Nellar (1993), Nores & Yzurieta (1994), Nores *et al.* (1983), Olrog (1968), Orfila (1938), de la Peña



Status and Conservation. Not globally threatened. CITES II. Uncommon to frequent throughout range, occurring in flocks up to 150, but still probably overlooked owing to silent behaviour and cryptic plumage when perched; locally abundant in Cordillera de Talamanca, Costa Rica, less so elsewhere in country; in Colombia perhaps most numerous in Santa Marta mountains.

Bibliography. Bloch *et al.* (1991), Byrd (1994), Desenne & Strahl (1994), Fjeldså & Krabbe (1990), Furssedonn (1992), Hilty & Brown (1986), Howell (1990), Howell & Webb (1995a), Low (1972), Martínez-Sánchez (1989), Meyer de Schauensee & Phelps (1978), Miller (1963), Monroe (1968), O'Neill (1981), Oxley (1978), Prante (1980), Prestwick (1954), Rasmussen *et al.* (1996), Ridgely (1981), Ridgely & Gwynne (1989), Slud (1964), Smith (1978a), Stiles & Skutch (1989), Stotz *et al.* (1996), Vriends (1979), Wetmore (1968), Whitney (1996).

254. Andean Parakeet

Bolborhynchus orbynesius

French: Toui d'Orbigny **German:** Andensittich **Spanish:** Catita Andina

Taxonomy. *Myiopsitta Orbynesia* Souancé, 1856, Yungas, Bolivia.

Appears to form a superspecies with *B. ferrugineifrons*. Formerly called *B. andicolus*, and in past regarded as a race of *Psilopsiagon aurifrons*. Monotypic.

Distribution. Highlands of Peru and NC Bolivia.



Descriptive notes. 16-17 cm; 48-50 g. Differs from *B. ferrugineifrons* only in being slightly smaller, and in replacing rufous around bill with yellow tinging to green. Female and immature have less or no yellow tinging. Immature has lighter bill.

Habitat. Semi-arid cloud-forest, *Polylepis* woodlands, bushy ravines in more open country, preferring vegetation with more complex botanical composition, mainly at 3000-4000 m, occasionally much higher (over 6000 m) and seasonally lower.

Food and Feeding. Seeds, fruits and berries, taken in bushes, bamboo, leguminous trees,

and on the ground.

Breeding. Claimed to be in a burrow in a steep bank.

Movements. Moves altitudinally down to montane valleys outside breeding season.

Status and Conservation. Not globally threatened. CITES II. Common locally, sometimes in large flocks, with over 300 recorded; population stable.

Bibliography. Dorst (1961), Fjeldså & Krabbe (1990), Inskipp *et al.* (1988), Koepcke (1970), Low (1972), Morrison (1948), O'Neill (1981), Olrog (1968), Parker *et al.* (1982), Peters & Griswold (1943), Remsen & Traylor (1989), Ridgely (1981), Roe & Rees (1979), Stotz *et al.* (1996), Wheatley (1994), Whitney (1996), Whitney *et al.* (1994).

255. Rufous-fronted Parakeet

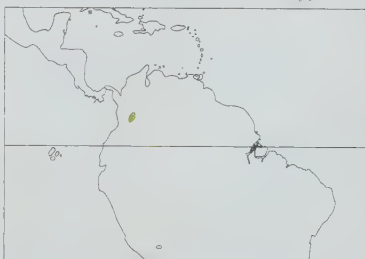
Bolborhynchus ferrugineifrons

French: Toui à front roux **German:** Rotstirnsittich **Spanish:** Catita Frentirrufo

Taxonomy. *Protogeris* [sic] *ferrugineifrons* Lawrence, 1880, Bogotá, Colombia.

Appears to form a superspecies with *B. orbynesius*. Monotypic.

Distribution. Colombia in C Andes.



Descriptive notes. 18-19 cm. Rich, fairly dark green, paler on underparts and rump; area around bill rufous; bluish on outer webs of primaries. Immature undescribed.

Habitat. Semi-humid and humid montane scrub and elfin forest at the border with *paramo* and agricultural areas, 3200-4000 m.

Food and Feeding. Ground-feeder, particularly taking grass seeds, including possibly *Calamagrostis effusa*, seeds of frailejones, and flowers and achenes of *Espeletia hartwegiana*.

Breeding. Males with developed gonads in Jan. Nests reportedly found in rock cavities in cliff.

Movements. No information. Likely to wander a little outside breeding season, and has been encountered as low as 2835 m.

Status and Conservation. **ENDANGERED.** CITES II. A BirdLife "restricted-range" species. Habitat degradation, caused by firewood-gathering, grazing, burning and cultivation, continues within its very restricted range, and it generally lives at low density, such that the total population might only be 1000-2000 birds. However, in Sept 1993 over 100 birds were seen in 8 hours in Los Nevados National Park, the bird's last stronghold. Also found in Alto Quindío Acame Natural Reserve and Ucumari Regional Park.

Bibliography. Arndt (1986), Beissinger & Snyder (1992), Carriker (1955), Collar (1996), Collar & Andrew (1988), Collar, Crosby & Stattersfield (1994), Collar, Gonzaga *et al.* (1992), Fjeldså & Krabbe (1990), Graves & Giraldo (1987), Hilty & Brown (1986), King (1978/79), Low (1972), Orejuela (1985), Renjifo (1991), Ridgely (1981), Salaman & Gandy (1993), Stotz *et al.* (1996), Wege & Long (1995), Whitney (1996).

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ssp cyanoptera

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ssp tuipara

ssp takatsukasae

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ssp gustavi

ssp beniensis

ssp chrysopterus

ssp chrysosema

ssp sanctithomae

ssp cyanophanes

ssp passerinus

ssp crassirostris

ssp flavissimus

ssp spengeli

ssp conspicillatus

ssp metae

Genus *FORPUS* Boie, 1858

256. Mexican Parrotlet

Forpus cyanopygius

French: Toui du Mexique **German:** Blaubürzel-Sperlingspapagei **Spanish:** Cotorrita Mexicana
Other common names: Blue-rumped Parrotlet

Taxonomy. *Psittacula cyanopygia* Souancé, 1856, north-western Mexico. Possible race *pallidus* likely to be indistinct from nominate or representing N end of cline. Two subspecies recognized.

Subspecies and Distribution.

F. c. cyanopygius (Souancé, 1856) - W Mexico.

F. c. insularis (Ridgway, 1888) - Tres Marias Is. off W Mexico.



Descriptive notes. 13-14 cm; 30-37 g. Green above with turquoise blue lower back, rump, secondary coverts, outer secondaries and underwing-coverts; lighter, grass green on face and undersides, latter sometimes tinged bluish. Female replaces blue with yellowish green. Immature like adult, male with reduced blue. Race *insularis* has darker green upperparts, underparts glaucous, and darker, more cobalt blue; larger.

Habitat. Tropical semi-deciduous to deciduous forest, riparian woodland, plantations, secondary forest, from sea-level to 1400 m.

Food and Feeding. Fruits including small

Ficus, berries and grass seeds, taken from ground.

Breeding. Jun-Jul on Tres Marias Is. perhaps later than on mainland. Nest presumably in tree cavity but apparently still unrecorded. Eggs 3 in captivity, where nestling period was c. 5 weeks.

Movements. Some seasonal wandering seems to occur, notably in the southernmost part of its range.

Status and Conservation. Not globally threatened. CITES II. A BirdLife "restricted-range" species. Common, and apparently little traded locally. Appears to have declined on Tres Marias, but small flocks persist.

Bibliography. Anon. (1983), Forshaw (1965), Friedmann *et al.* (1950), Goddard (1927), Grant (1965, 1966), Grant & Cowan (1964), Howell & Webb (1995a), Konrad (1986), Low (1972), McLellan (1927), Nelson (1899), Pfeffer (1992), Ridgely (1981), van Rossem (1945), Schaldach (1963), Stotz *et al.* (1996), Whitney (1996), Zimmerman & Harry (1951).

257. Green-rumped Parrotlet

Forpus passerinus

French: Toui été **German:** Grünbürzel-Sperlingspapagei **Spanish:** Cotorrita Culiverde
Other common names: Guiana/Common/Blue-winged Parrotlet

Taxonomy. *Psittacus passerinus* Linnaeus, 1758, Surinam.

Forms a superspecies with *F. crassirostris*. Five subspecies recognized.

Subspecies and Distribution.

F. p. cyanophanes (Todd, 1915) - N Colombia.

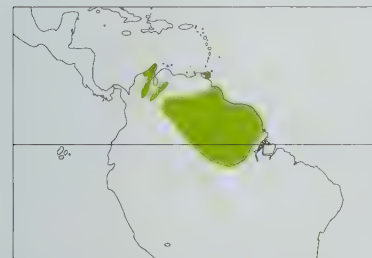
F. p. viridissimus (Lafresnaye, 1848) - N Venezuela perhaps into NE Colombia; also Trinidad, where possibly introduced.

F. p. passerinus (Linnaeus, 1758) - the Guianas, mainly near coast.

F. p. cyanochlorus (Schlegel, 1864) - Roraima, NW Brazil.

F. p. deliciosus (Ridgway, 1888) - lower Amazon in Brazil.

Introduced (*viridissimus*) to Curaçao in Netherlands Antilles, and (perhaps same race) to Jamaica and Barbados.



Descriptive notes. 12-13 cm; 20-28 g. Green, lighter on forehead, cheeks, underparts, back and rump (this last brightest, but sometimes washed blue); grey tinge on hindneck; primary coverts and underwing-coverts dark blue, secondaries blue; greater coverts pale blue. Female replaces blue markings with green, forehead more yellowish. Immature like adult. Race *viridissimus* darker green throughout; *cyanophanes* with more blue on closed wing; *cyanochlorus* like *passerinus* but female more yellowish; *deliciosus* with pale blue tinge on rump, darker blue on secondaries, female with strong yellow tinge on forehead.

Habitat. Semi-open lowland areas such as dry deciduous and gallery forest edge, second growth, thornbush and cactus scrub, mangroves, less common in savanna, though often moving into open grassland to feed; also in city parks, ranchland and agricultural areas. Up to 1800 m.

Food and Feeding. Grass seeds, especially *Croton hirtus*, *Hyptis suaveolens*, *Wissadula*, *Cyperus*, *Scoparia dulcis* and *Melochia parviflora*, often obtained by settling on grass stems and allowing weight to bend seedhead to ground. Also berries (e.g. of mistletoes), fruits such as *Anona* and *Psidium guajava*, leafbuds, blossoms; seeds of *Lagerstroemia indica* and sunflowers.

Breeding. Season probably extended in most of range. Most months from Feb to Aug on Trinidad; Feb, Jun, Aug and Nov in Surinam; Apr-Aug in Venezuela; May-Jun, Aug and Oct-Nov in Colombia. Nest in

hollow stump, limb or trunk, or arboreal termitarium; also more rarely in palm frond base and artificial site such as end of piping. Usually 5 eggs (2-11); incubation takes around 14 days, but hatching staggered; nestling period 4-5 weeks. In captivity young almost immediately independent, suggesting scope for second brood, and in wild half of females attempt repeat breeding.

Movements. Occurs, perhaps only as a seasonal upslope movement, in lower subtropical zone.

Status and Conservation. Not globally threatened. CITES II. Generally common and probably increasing with clearance of forest within its range. Heavily traded in and from Venezuela. Appears to have colonized Trinidad this century, perhaps originally through introduction; now common there, and rapidly spreading on Tobago, where recently introduced.

Bibliography. Beissinger & Stoleson (1991), Beissinger & Waltman (1991), Bond (1985), Curlee & Beissinger (1995), Desenne & Strahl (1991, 1994), Enehjelm (1951), ffrench (1991), ffrench & ffrench (1966), Gruber (1981), Haverschmidt & Mees (1994), Hilty & Brown (1986), Lever (1987), Low (1972), Meier (1984), Meyer de Schauensee & Phelps (1978), Pinto (1964), Ridgely (1981), Sick (1985, 1993), Snyder (1966), Stoleson & Beissinger (1994), Stotz *et al.* (1996), Tostain *et al.* (1992), Vriends (1979), Waltman & Beissinger (1992), Wetmore (1939), Whitney (1996).

258. Blue-winged Parrotlet

Forpus crassirostris

French: Toui de Spix **German:** Blauflügel-Sperlingspapagei **Spanish:** Cotorrita Aliazul

Taxonomy. *Psittacula crassirostris* Taczanowski, 1883, Yurimaguas, Peru.

Forms a superspecies with *F. passerinus*. Commonly referred to as *F. xanthopterygius*, which was shown in 1905 to have been applied to an immature *Brotogeris chiriri*, but which was mistakenly reinstated in 1945 when present species was separated from *F. passerinus*. Isolated race *spengeli* might belong with *F. cyanopygius* of Mexico; proposed race *olallae* included within nominate. Five subspecies currently recognized.

Subspecies and Distribution.

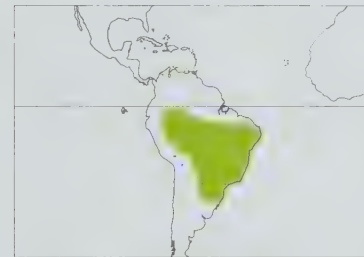
F. c. spengeli (Hartlaub, 1885) - N Colombia.

F. c. crassirostris (Taczanowski, 1883) - SE Colombia, E Ecuador and N Peru to W Brazil.

F. c. flavescens (Salvadori, 1891) - SE Peru and E Bolivia.

F. c. flavissimus Hellmayr, 1929 - NE Brazil.

F. c. vividus (Ridgway, 1888) - E & SE Brazil, Paraguay and N Argentina.



Descriptive notes. 12-13 cm; 30 g. Green, slightly lighter and yellower below; bright emerald green around eye; bend of wing, primary and secondary coverts, underwing-coverts, lower back and rump blue. Female replaces all blue with green. Immature like equivalent adult, male with reduced blue. Race *flavissimus* has forehead, cheeks and throat lemon yellow (male), yellowish face (female); *vividus* has darker blue (male) or more yellowish tint (female) than *crassirostris*; *flavescens* has yellowish tinge, male with blue paler; *spengeli* has turquoise blue on back and rump, male has violet blue in wing, female has yellowish forehead.

lowish forehead.

Habitat. In C of range gallery forest, light riparian growth, matorral (patchy, varied riverine thickets), lowland rain forest edge and secondary growth, but at edges of range it also occupies savanna, palm groves and semi-arid scrub as well as pastures, parkland and suburbs. Ranges up to 1200 m.

Food and Feeding. Mainly fruit and seeds of plants in secondary vegetation, including grass seed taken from ground; specific items include seeds of *Mikania*, *Cecropia glaziovii*, *Trema micrantha*, flowers of *Ambrosia polystachya*, *Maregravia polyantha*.

Breeding. Precise timing unclear; occupied nest-hole in Jul, Colombia. Nest in hole in tree (e.g. *Cecropia*), in termite nest, or in disused nest of Rufous Hornero (*Furnarius rufus*), with grass stems used to provide flooring; rarely in Red-rumped Cacique (*Cacicus haemorrhous*) nest. Eggs 4-7, 8 in captivity, when incubation (by female only) was estimated at c. 18 days, nestling period c. 4 weeks.

Movements. Seasonal movements related to flowering and fruiting of various communities of plants are reported for Argentina, while in Atlantic Forest, Brazil, it is an altitudinal migrant.

Status and Conservation. Not globally threatened. CITES II. Common over most of range, and possibly expanding numbers with fragmentation of Amazonian forest. Possible decline, Paraguay, where reported common at start of century and now generally uncommon to rare. Trade appears low.

Bibliography. Canevari *et al.* (1991), Collar (1997), Contreras (1990), Contreras *et al.* (1990), Darrieu (1983d), Galetti (1996), Guix (1995), Hayes (1995), Hayes *et al.* (1990), Hilty & Brown (1986), López (1992), Low (1972), Mitchell (1957), Mobbs (1981), Norez & Yzurieta (1994), O'Neill (1981), Olmos (1993), de la Peña (1988), Pinto (1945b), Pizo *et al.* (1995), Ridgely (1981), do Rosário (1996), Short (1975), Sick (1985, 1993), Stotz *et al.* (1996), Tallman *et al.* (1977), Terborgh & Weske (1969), Watson (1905), Whitney (1996).

259. Spectacled Parrotlet

Forpus conspicillatus

French: Toui à lunettes **German:** Brillensperlingspapagei **Spanish:** Cotorrita de Anteojos

Taxonomy. *Psittacula conspicillata* Lafresnaye, 1848, Honda, upper Magdalena Valley, Colombia. Proposed race "*pallascens*", from Patía Valley of SW Colombia, is a *nomen nudum*. Three subspecies recognized.

Subspecies and Distribution.

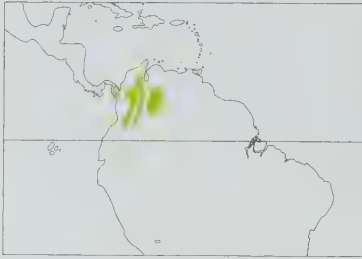
F. c. conspicillatus (Lafresnaye, 1848) - E Panama and NC Colombia.

F. c. metae Borrero & Camacho, 1961 - C Colombia E to W Venezuela.

F. c. caucae (Chapman, 1915) - SW Colombia; possibly recorded (most likely this race) in W Ecuador.

Descriptive notes. 12-13 cm; 24-28 g. Grass green on forehead, face and throat, duller on back, wings and tail, with deep blue lower back, rump and secondaries, paler blue on shoulder and greater

On following pages: 260. Dusky-billed Parrotlet (*Forpus sclateri*); 261. Pacific Parrotlet (*Forpus coelestis*); 262. Yellow-faced Parrotlet (*Forpus xanthops*); 263. Plain Parakeet (*Brotogeris tirica*); 264. Canary-winged Parakeet (*Brotogeris versicolurus*); 265. Yellow-chevroned Parakeet (*Brotogeris chiriri*); 266. Grey-cheeked Parakeet (*Brotogeris pyrrhopterus*); 267. Orange-chinned Parakeet (*Brotogeris jugularis*); 268. Cobalt-winged Parakeet (*Brotogeris cyanoptera*); 269. Golden-winged Parakeet (*Brotogeris chrysopterus*); 270. Tui Parakeet (*Brotogeris sanctithomae*).



wing-coverts; bluish green underwing-coverts; bluish around and behind eye; silvery green on undersides. Female lacks all blue, and is yellowish green on undersides. Immature like adult, male with less blue. Race *metae* is more yellow green below, blue round eye reduced; *cauca* has lighter blue on back and wings, larger bill, with populations in arid Patía and Dagua valleys paler still.

Habitat. Lowland evergreen forest edge, gallery forest, semi-open deciduous woodland, llanos, secondary growth, thorn scrub, pastures and clearings, 100-1800 m, occasionally to 2600 m.

Food and Feeding. Grass seeds taken from ground, berries, fruits, buds and probably blossoms from bushes.

Breeding. Dec-Mar in Colombia. Nest a hole in a stump, tree, termitarium or fence post made of bamboo (*Guadua*), often as low as 1-2 m from ground. Eggs 1-6.

Movements. No information.

Status and Conservation. Not globally threatened. CITES II. Some habitat destruction and illegal trade has affected the species in Venezuela and it is fairly uncommon in Panama, but in Colombia it has benefited from forest clearance, increasing its range and becoming abundant in many areas.

Bibliography. Desenne & Strahl (1991, 1994), Fjeldså & Krabbe (1990), Garnetke-Stollmann & Franck (1990, 1991), Gómez (1991), Haffer (1986), Hilty & Brown (1986), Kattan & Gómez (1992), Low (1972), Meyer de Schauensee & Phelps (1978), Miller (1947, 1963), Molenda & Molenda (1994), Munves (1975), Olivares (1969), Ridgely (1981), Ridgely & Gwynne (1989), Stotz *et al.* (1996), Wanker *et al.* (1996), Wetmore (1968), Whitney (1996), Zinniker (1987).

260. Dusky-billed Parrotlet

Forpus sclateri

French: Toui de Sclater

Spanish: Cotorrita de Sclater

German: Schwarzschnabel-Sperlingspapagei

Other common names: Sclater's Parrotlet

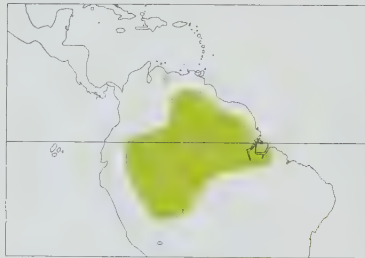
Taxonomy. *Psittacula Sclateri* G. R. Gray, 1859, Rio Javari, Peru.

Precise boundaries between the two races remain unclear. Two subspecies recognized.

Subspecies and Distribution.

F. s. eidos J. L. Peters, 1937 - E Colombia and S & SE Venezuela (also outlying in Carabobo) through Guyana (two records) and S French Guiana to N Brazil.

F. s. sclateri (G. R. Gray, 1859) - SE Colombia, NE Ecuador, E Peru and N Bolivia E through Amazon basin to N Brazil S of Amazon delta.



Descriptive notes. 13 cm; 28 g. Darker green than congeners, forehead, cheeks and chin emerald, underparts more glaucous; lower back, rump and large panel on wing dark blue; upper mandible dark brown-grey. Female replaces blue with green, generally paler and more yellowish on underparts. Immature undescribed.

Habitat. Clearings, edge and other secondary habitats within tropical lowland rain forest and, perhaps most importantly, seasonally flooded várzea forest along rivers; locally in Ecuador up to 1000 m.

Food and Feeding. Seeds of *Cecropia*

miparia; no other information.

Breeding. Possibly Jul in Peru. Nest probably in hole in dead tree, etc. No other information.

Movements. Nothing is known.

Status and Conservation. Not globally threatened. CITES II. Fairly common in W Amazonia, becoming scarcer in E where once common; but increasing in numbers in Colombia. Little if at all traded.

Bibliography. Allen (1995), Desenne (1994), Desenne & Strahl (1991, 1994), Friedmann (1948b), Hilty & Brown (1986), Low (1972), Meyer de Schauensee & Phelps (1978), O'Neill (1974, 1981), Pearson (1972), Pinto (1964), Ridgely (1981), Sick (1985, 1993), Snyder (1966), Stotz *et al.* (1996), Tallman *et al.* (1977), Tostain *et al.* (1992), Wheatley (1994), Whitney (1996).

261. Pacific Parrotlet

Forpus coelestis

French: Toui céleste

German: Himmelsperlingspapagei

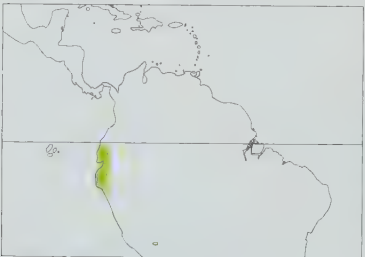
Spanish: Cotorrita de Piura

Other common names: Celestial/Western Parrotlet

Taxonomy. *Agapornis coelestis* Lesson, 1847, Peru.

Forms a superspecies with *F. xanthops*, with which has been considered conspecific. Monotypic.

Distribution. W Ecuador to NW Peru.



Descriptive notes. 13 cm; 24-28 g. Light green crown and face with bluish postocular stripe merging into blue-grey of hindcrown, nape and sides of neck, this in turn shading to green-grey on back and wings; lower back, rump and large patch on wing dark blue; underparts green with grey flanks; tail dull green. Female replaces all blue with emerald green, apart from blue to bluish green tinge from eye to nape. Immature like adult, but male with less blue.

Habitat. Arid lowland scrub, semi-open tropical deciduous woodland, gallery forest and secondary growth, locally and more sparsely in

humid vegetation, up to 1500 m.

Food and Feeding. Berries taken amid branches, cactus and *Tamarindus* fruits, seeds taken from the ground.

Breeding. Jan-May in Ecuador. Nests in any natural or artificial cavity, from holes in trees, branches, fence posts and telephone poles to the ends of pipes and bamboo rafters; also old mud nests of Pale-legged Hornero (*Furnarius leucopus*) and large stick nests of Necklaced Spinetail (*Synallaxis stictothorax*) and Fasciated Wren (*Campylorhynchus fasciatus*); no lining. Eggs 4-6, but family parties supposedly of 10 suggest more possible; incubation 17 days; nestling period c. 30 days. Second brood sometimes reared, commencing as little as 7-8 days after fledging.

Movements. No information.

Status and Conservation. Not globally threatened. CITES II. A BirdLife "restricted-range" species. Common to abundant, and apparently able to withstand both moderate levels of trade and moderate levels of habitat conversion to agriculture, so long as some trees are left.

Bibliography. Best & Clarke (1991), Best & Kessler (1995), Bloch *et al.* (1991), Boorer (1964), Brockner (1994), Butler (1979), Ginsberg (1984), Lantermann (1996), Low (1972), Marchant (1960), O'Neill (1981), Olrog (1968), Parker *et al.* (1982), Ridgely (1981), Stotz *et al.* (1996), Taylor (1995a), Wheatley (1994), Whitney (1996), Williams *et al.* (1996).

262. Yellow-faced Parrotlet

Forpus xanthops

French: Toui à tête jaune

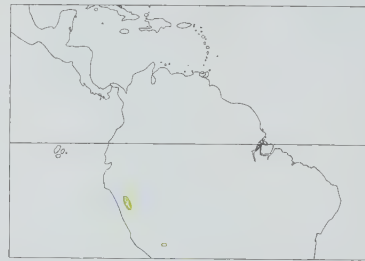
Spanish: Cotorrita Carigualda

German: Gelbmasken-Sperlingspapagei

Taxonomy. *Psittacula xanthops* Salvin, 1895, Viña, Huamachuco.

Has been judged a subspecies of *F. coelestis*, to which it is clearly closely related; but size and colour differences suggest better treated as members of a superspecies. Monotypic.

Distribution. NC Peru in upper Marañón Valley.



Descriptive notes. 15 cm. Yellow crown and face with bluish postocular stripe merging into bluish grey of hindcrown and nape, this in turn merging into olive grey on sides of neck, back and wings; lower back, rump, uppertail-coverts and large patch on wing dark blue, paler on secondary coverts; underparts greenish yellow; underwing-coverts dark blue; tail green. Female has back and rump pale blue, less blue in wing. Immature undescribed.

Habitat. Cactus-*Prosopis* montane desert scrub, dry deciduous forest and riparian thickets at 600-1800 m; a roost was in *Ginerium* canebrake.

Food and Feeding. Fruits or seeds of a leguminous tree *Cercidium praecox*, cactus fruits and seeds, flowers of *Bombax discolor*; observed on the ground where doubtless feeding on grass seed, and will feed on ripe wheat.

Breeding. Mar-Apr. Nests reportedly placed in natural dirt and rock walls along R Marañón, in colonies of up to 70 birds; old woodpecker cavities also used. In captivity: 3-6 eggs; incubation 21-22 days; and nestling period 35-40 days.

Movements. Apparently sedentary.

Status and Conservation. **VULNERABLE.** CITES II. A BirdLife "restricted-range" species. Until relatively recently (c. 1980) considered common to abundant, but heavily traded internally apparently since 1963, with around 600 birds reportedly captured every week in the period 1981-1984, after which legal protection was introduced. Moreover, steady deterioration of habitat in the face of cultivation and goat damage may pose serious problems in parts of its highly restricted range. It occurs in no protected area, but is still considered a pest in two localities.

Bibliography. Anon. (1993), Begazo (1996), Bond (1955), Collar (1996), Collar, Crosby & Stattersfield (1994), Collar, Gonzaga *et al.* (1992), Davies *et al.* (1994), Dorst (1957a, 1957b), Girdler & Austin (1982), Inskipp *et al.* (1988), Low (1972), Mitchell (1991), O'Neill (1981, 1987), Parker *et al.* (1982), Pulido (1991), Ridgely (1981), Robiller (1990), St. Vaughan (1983), Stotz *et al.* (1996), Wege & Long (1995), Whitney (1996).

Genus BROTOGERIS Vigors, 1825

263. Plain Parakeet

Brotogeris tirica

French: Toui tirica

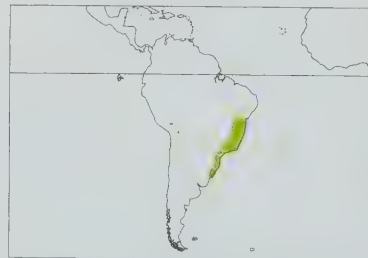
German: Tirikassittich

Spanish: Catita Tirica

Taxonomy. *Psittacus Tirica* J. F. Gmelin, 1788, Brazil.

Monotypic.

Distribution. CE Brazil from Alagoas S to at least Santa Catarina and ranging inland as far as E Goiás.



Descriptive notes. 23 cm; 63 g. Green, slightly more yellowish on undersides; minor bluish tinge on nape; shoulder bronze green, flight-feathers and underside of tail bluish green. Blue mutation on São Paulo coast. Immature has less blue in wings and shorter tail.

Habitat. Canopy and edge of lowland and montane rain forest, secondary growth, semi-open cultivated land with scattered groves, plantations and city parks, generally in lowlands but ranging up to 1200 m.

Food and Feeding. Pulp of *Posoqueria latifolia*, seeds of *Ficus glabra*, *Trema micrantha*, *Xylopia brasiliensis*, *Vriesea*,

Rhipsalis, *Cecropia glazioui*, *Hieronyma alchorneoides*, *Merostachis*, seeds and flowers of *Tibouchina mutabilis* and the mistletoe *Psittacanthus*, flowers of *Norantea brasiliensis* and *Eucalyptus*, nectar of *Pseudobombax*, possibly insects and their larvae.

Breeding. Probably Sept-Dec, the usual breeding season in SE Brazil, with records of nest in Sept and young in Jan. Nest in hollow in tree. In captivity: 4 eggs; incubation, only by female, lasted c. 26 days; young fledged at 7 weeks.

Movements. Shifts in numbers occur, reflecting local seasonal movements.

Status and Conservation. Not globally threatened. CITES II. Common in many parts of its range, and probably now stable after centuries of slow decline as agriculture cleared out trees in many areas. Tolerates changes far more than any other parrot endemic to SE Brazil, as confirmed by presence in heart of São Paulo. Present in many protected areas including Itatiaia National Park. Rare in captivity, and export banned from Brazil.

Bibliography. Derks (1997), Dubs (1992), Forrester (1993), Guix (1995), Guix *et al.* (1992), Inskipp *et al.* (1988), Lovell-Keays (1914b), Low (1972), Mitchell (1957), Pinto (1935, 1964), Pizo *et al.* (1995), Ridgely (1981), do Rosário (1996), Sick (1985, 1993), Stotz *et al.* (1996), Teixeira *et al.* (1986), Vriends (1979), Whitney (1996), Willis & Oniki (1981).

264. Canary-winged Parakeet

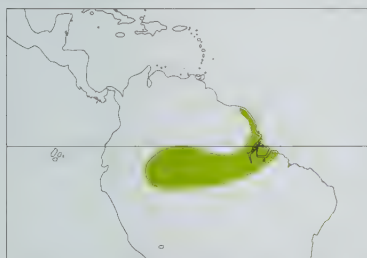
Brotogeris versicolurus

French: Toui à ailes variées **German:** Weißflügelsittich **Spanish:** Catita Versicolor

Taxonomy. *Psittacus versicolurus* P. L. S. Müller, 1776, Cayenne.

Often treated as conspecific with *B. chiriri*, but the two are reported to be sympatric without interbreeding in E Pará. Monotypic.

Distribution. Amazon basin from SE Colombia and NE Peru through Brazil to coastal Pará, and N into French Guiana. Feral populations in Lima, Peru, and on Puerto Rico and mainland USA.



Descriptive notes. 22 cm; 52-68 g. Green, darker on back; forehead and face slightly bluish, lores bare; inner primaries and secondaries white, secondary coverts yellow.

Habitat. River island vegetation, seasonally inundated várzea forest, secondary forest and clearings near settlements.

Food and Feeding. Virtually unknown in wild conditions. Seeds and fruit have been found in stomachs. Wild birds have fed on cultivated Inga fruits in gardens, Colombia, and feral birds (either this species or *B. chiriri*), USA, have adapted to various exotic food sources including blossoms and nectar.

Breeding. Young for sale in Jul in Peru. Nest in hole in tree. Probably 4-5 eggs.

Movements. No information. Probably largely sedentary.

Status and Conservation. Not globally threatened. CITES II. Common to abundant in most of range including Peru, Pará and Amapá, though generally uncommon in SE Colombia.

Bibliography. Anon. (1993), Arrowood (1981, 1986, 1991), Derks (1997), Dugand & Borrero (1946), Fjeldsá & Krabbe (1990), Goodfellow (1900), Hilty & Brown (1986), Inskipp *et al.* (1988), Lever (1987), Low (1972), O'Neill (1981), Pérez-Rivera (1984), Pérez-Rivera *et al.* (1985), Pinto (1964), Ridgely (1981), da Rocha *et al.* (1988), Short (1975), Shrods (1974), Sick (1985, 1993), Stone (1929), Stotz *et al.* (1996), Tostain *et al.* (1992), Whitney (1996).

265. Yellow-chevroned Parakeet

Brotogeris chiriri

French: Toui à ailes jaunes **German:** Gelbflügelsittich **Spanish:** Catita Chiriri
Other common names: Chiriri Parakeet

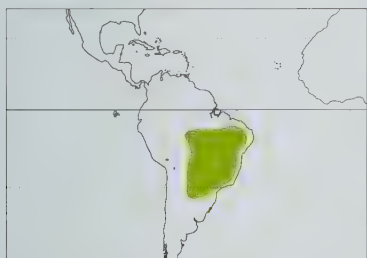
Taxonomy. *Psittacus chiriri* Vieillot, 1818, Paraguay.

Often treated as conspecific with *B. versicolurus*, but the two are reported to be sympatric without interbreeding in E Pará. Two subspecies recognized.

Subspecies and Distribution.

B. c. behni Neumann, 1931 - C & S Bolivia.

B. c. chiriri (Vieillot, 1818) - N Bolivia, Paraguay and N Argentina E to NE, C & SE Brazil (S to São Paulo).



Descriptive notes. 20-25 cm. Grass green, yellowish on underparts and underside of tail; primaries tinged blue at bases; outer secondary coverts yellow. Immatures similar. Race *behni* larger, lacking yellowish tinge to underparts and tail.

Habitat. Gallery forest in open country, subtropical forest, relatively open woodland, seasonally flooded grassland and *caatinga* vegetation, up to 1560 m.

Food and Feeding. No information.

Breeding. Nest-site prospection in Jan in Mato Grosso.

Movements. Some seasonal movements, undefined, may occur in W Paraguay, and large flocks have been observed in Nov, Mato Grosso, before breaking up into pairs in Jan, which implies some accumulative and dispersive behaviour.

Status and Conservation. Not globally threatened. CITES II. Common to abundant in most of range, including Maranhão, Goiás, Mato Grosso, but rare to uncommon in Argentina although 46,522 birds were exported from that country in 1985-1989, evidently having originated further N.

Bibliography. Anon. (1993), Brooks *et al.* (1993), Canevari *et al.* (1991), Contreras *et al.* (1990), Dabbene (1914), Derks (1997), Fjeldsá & Krabbe (1990), Guix (1995), Hayes (1995), Low (1972), Naumburg (1930), Navas & Bó (1996), Nores & Yzurieta (1994), Orfila (1938), de la Peña (1988), Pérez (1990), Pinto (1964), Ridgely (1981), Schubart *et al.* (1965), Short (1975), Sick (1985, 1993), Stotz *et al.* (1996), Vriends (1979), Whitney (1996).

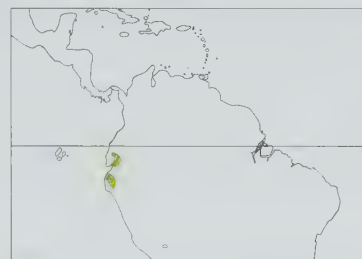
266. Grey-cheeked Parakeet

Brotogeris pyrrhopterus

French: Toui flamboyant **German:** Feuerflügelsittich **Spanish:** Catita Macareña

Taxonomy. *Psittacus pyrrhopterus* Latham, 1801, Brazil; error = Guayaquil, Ecuador. Monotypic.

Distribution. W & SW Ecuador and extreme NW Peru.



Descriptive notes. 20 cm; 60-68 g. Crown bluish green, cheeks pale grey; body and wings green, lighter below; underwing-coverts orange red. Immatures have green crowns.

Habitat. Evergreen and disturbed humid forest, deciduous *Ceiba trichistandra* forest and woodland (birds seemingly most numerous in this habitat), extending into arid *Acacia*-dominated scrubland and semi-open cultivated areas, only up to 300 m in N of range but up to 1550 m in S.

Food and Feeding. Petals and seeds of *Erythrina* trees, flowers and seeds of *Chorisa*, flowers of *Cavanillesia platanifolia*, fruit of

Ceiba and *Ficus*, and catkins of *Cecropia*. Flocks in vicinity of banana plantations were presumably using this food source, and some birds are reportedly trapped for trade while raiding crops.

Breeding. Most activity probably coincides with the wet season, Jan-Mar, although specimens from Jul had slightly enlarged gonads, and copulation witnessed in Aug. Large trees with hollow limbs apparently needed for nest-holes; termite mounds also used. In captivity: 4-7 eggs; young fledge at 6 weeks.

Movements. The scarcity of the species in certain apparently suitable areas may reflect seasonal displacements, which are thought likely to occur.

Status and Conservation. Not globally threatened. CITES II. Currently considered near-threatened. A BirdLife "restricted-range" species. Formerly abundant, now only locally common. Present in four protected areas: Cerro Blanco Reserve, Arenillas Military Reserve and Manglares-Churute Ecological Reserve in Ecuador, and Tumbes National Forest in Peru. Large-scale conversion of forest to agriculture has caused substantial reduction of presence within historical range, this being compounded by substantial chronic exploitation for trade (both local and international) and, possibly, depletion of suitable natural nest-sites. Total of 59,320 birds, almost entirely from Peru (but very possibly originating in Ecuador) reported as having been imported by CITES countries, 1983-1988, representing absolute minimum, and only international trade; moreover, most birds are captured as nestlings and the mortality rate is not known. The world population of wild birds is now judged only 15,000; both range states now have bans on international trade.

Bibliography. Alemán (1994), Anderdon (1994), Beissinger & Snyder (1992), Best & Clarke (1991), Best & Kessler (1995), Best, Checker *et al.* (1996), Best, Clarke *et al.* (1993), Best, Krabbe *et al.* (1995), Bloch *et al.* (1991), Brosset (1964), Butler (1979), Chapman (1926), Collar (1996), Collar & Andrew (1988), Derks (1997), Germeau (1994), Hampe (1939), Harris (1985, 1993a), Inskipp & Corrigan (1992), Low (1972, 1987b), O'Neill (1981), Parker, Parker & Plenge (1982), Parker, Schulenberg *et al.* (1995), Ridgely (1981), Stotz *et al.* (1996), Vriends (1979), Whitney (1996), Williams & Tobias (1994), Worth (1993).

267. Orange-chinned Parakeet

Brotogeris jugularis

French: Toui à menton d'or **German:** Tovisittich **Spanish:** Catita Churica
Other common names: Tovi Parakeet

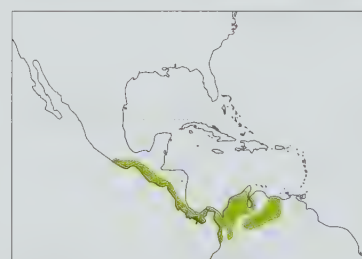
Taxonomy. *Psittacus jugularis* P. L. S. Müller, 1776, Bonda, Santa Marta, Colombia.

Possibly forms a superspecies with *F. cyanoptera* and *F. chrysopterus*. Two subspecies recognized.

Subspecies and Distribution.

B. j. jugularis (P. L. S. Müller, 1776) - SW Mexico through Central America mostly on Pacific slope to N Colombia and NW Venezuela.

B. j. exsul Todd, 1917 - E Colombia and W Venezuela.



Descriptive notes. 18-19 cm; 53-65 g. Head bright green with bluish wash on crown, white eye-ring and pale bill, small orange patch on chin; underparts bright green, bluish on thighs and vent; upperparts and tail bluish green with brown "shoulders", yellow underwing-coverts; amount of yellow in plumage rather variable. Immature similar. Race *exsul* has all-green underparts, darker shoulders with more olive in mantle, smaller, paler chin-patch.

Habitat. Open dry country with scattered trees, llanos, semi-deciduous and deciduous woodland, semi-open, secondary and gallery forest, plantations, cultivated areas and parks and tree-

shaded areas of towns, usually avoiding or less common in evergreen forest canopy and edge. Ranges up to 1400 m.

Food and Feeding. Fruits and seeds of e.g. *Ficus*, *Ceiba*, *Bombax*, *Byrsonima*, *Cecropia*, *Muntingia*, nectar and blossoms of e.g. guava, balsa and *Erythrina*; can cause damage to cultivated fruit.

Breeding. Jan-Apr. Nest in old woodpecker hole, palm stub, excavated by pair in termitarium, or in natural cavity, sometimes communally in one large rotten snag. Eggs 4-7, with 8 young reported from one nest; incubation in captivity lasted around three weeks.

Movements. Wanders locally after breeding, El Salvador.

Status and Conservation. Not globally threatened. CITES II. Common to abundant throughout most of range, but uncommon in Oaxaca, Mexico.

Bibliography. Binford (1989), Chapman *et al.* (1989), Derks (1997), Dickey & van Rossem (1938), Eisenmann (1961, 1968), Harrison & Holyoak (1970), Hilty & Brown (1986), Hood (1961), Howell, S.N.G. & Webb (1995a), Howell, T.R. (1957), Janzen (1981), Land (1970), Lever (1987), Low (1972), Meyer de Schauensee & Phelps (1978), Monroe (1968), Power (1966, 1967), Ridgely (1981), Ridgely & Gwynne (1989), Rowley (1984), Slud (1964), Sules & Skutch (1989), Stotz *et al.* (1996), Vriends (1979), Wetmore (1957, 1968), Whitney (1996).

268. Cobalt-winged Parakeet

Brotogeris cyanoptera

French: Toui de Deville **German:** Kobaltflügelsittich **Spanish:** Catita Aliazul

Taxonomy. *Sittace cyanoptera* Salvadori, 1891, Mission de Sarayacu and Amazon River.

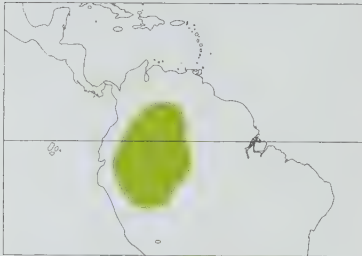
Forms a parapatric species pair with *B. chrysopterus*, and these two may form superspecies with *B. jugularis*. Race *gustavi* may be separate species, although intermediates between this and nominate race have been found in lower Huallaga Valley. Three subspecies normally recognized.

Subspecies and Distribution.

B. c. cyanopectera (Salvadori, 1891) - SE Colombia and S Venezuela to E Ecuador, E Peru and WC Brazil.

B. c. gustavi Berlepsch, 1889 - upper Huallaga, N Peru.

B. c. beniensis Gyldestolpe, 1941 - N Bolivia.



Descriptive notes. 18-20 cm; mean 67 g. Green, darker on uppersides; forehead yellowish, crown and nape tinged blue, eye-ring whitish, chin orange; flight-feathers blue, tail green with blue centre. Immature duller. Race *gustavi* has little blue on head, yellow on carpal edge; *beniensis* paler, combining bluish tinge on head with yellow on carpal edge.

Habitat. Lowland rain forest (commoner on higher areas), humid second growth, forest edges, seasonally inundated *várzea* forest, riverbanks, partly cleared areas, savanna and llanos; reaches over 1000 m in W of range, but only occasional at 1350 m.

Food and Feeding. Little information. Recorded visiting flowering and fruiting trees, and eating *Cecropia* catkins.

Breeding. Little information. Evidence of breeding Jun-Jul in W of range, including pairs at holes in trees. In captivity: 5 eggs; hatching occurred in 24 days.

Movements. Apparently sedentary, with some possibly seasonal upslope wandering.

Status and Conservation. Not globally threatened. CITES II. Common throughout range, but with no recent evidence of trade, hence rare in captivity. Present in Manu National Park, Peru, where density reaches 16 pairs/km².

Bibliography. Allen (1995), Clarke & Clarke (1987), Davis (1986), Derks (1997), Desenne & Strahl (1991, 1994), Dugand & Borrero (1948), Friedmann (1948b), Harris (1984), Hilty & Brown (1986), Inskipp *et al.* (1988), Low (1972, 1987b), Meyer de Schauensee & Phelps (1978), O'Neill (1974, 1981), O'Neill & Pearson (1974), Pearson (1972, 1975c), Pinto (1964), Ridgely (1981), Scott (1988), Sick (1985, 1993), Stotz *et al.* (1996), Terborgh, Fitzpatrick & Emmons (1984), Terborgh, Robinson *et al.* (1990), Whitney (1996).

269. Golden-winged Parakeet

Brotogeris chrysopterus

French: Toui para

German: Braunkinnsittich

Spanish: Catita Alidorada

Taxonomy. *Psittacus chrysopterus* Linnaeus, 1766, India; error = Guiana.

Forms a parapatric species pair with *B. cyanopectera*, and these two may form superspecies with *B. jugularis*. Five subspecies recognized.

Subspecies and Distribution.

B. c. chrysopterus (Linnaeus, 1766) - NE Venezuela SE through the Guianas to Roraima and Amapá, CN Brazil.

B. c. tenuifrons Friedmann, 1945 - upper R Negro, NW Brazil.

B. c. solimoensis Gyldestolpe, 1941 - Manaus region, NC Brazil.

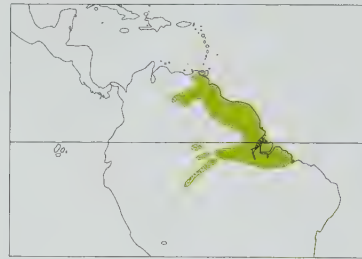
B. c. tuipara (J. F. Gmelin, 1788) - R Tapajós E to Maranhão, NC Brazil.

B. c. chrysosoma P. L. Sclater, 1864 - R Madeira S to N Mato Grosso, W Brazil.

Descriptive notes. 16 cm; 47-80 g. Close to *B. cyanopectera* but primary coverts bright orange, chin spot orange brown, blue in flight-feathers greatly reduced; has brownish frontal band. Immatures lack orange in wing. Race *tuipara* has frontal band and chin spot orange, yellow edging to outer tail feathers; *chrysosoma* larger, with yellowish orange forehead and yellow primary coverts; *solimoensis* like *cyanopectera* but frontal band and chin paler; *tenuifrons* like *tuipara* but with no frontal band.

Habitat. Cloud forest to 1200 m N of Orinoco, elsewhere lowland primary rain forest, second-growth along waterways, savanna, coastal sand-ridge woodland, edges and centres of towns in large trees.

Food and Feeding. Largely concentrates on flowers, taking nectar of e.g. *Noranthea*, *Inga laterifolia*, *Erythrina amazonica*, *Virola surinamensis*, *Tabebuia serratifolia*, *Pithecellobium pedicellare*, *Bertholletia*



excelsa, *Allantonia lineata* and possibly *Micropholis melinoneana*; also green seed of *Cecropia miparia*, seed of *Alibutia edulis* and Bombacaceae, seed and pulp of *Ficus* and *Sterculia excelsa*, fruit of the palm *Astrocaryum vulgare*, berries of *Trema micrantha*, and surface algae, insects and snails in pools.

Breeding. Occupied nest-holes in Feb, Apr, Sept and Nov in Surinam; Apr, Jul-Aug and Nov in French Guiana, where numerous flying young observed in May; Sept-Oct and possibly Apr-May in N Mato Grosso. Uses tree-holes and arboreal termitaria. Eggs 3-4. No further information.

Movements. Some irregular wandering suggested by records near Paramaribo, Surinam, in Jul-Aug and Oct 1964 in contrast to other years.

Status and Conservation. Not globally threatened. CITES II. Locally common to abundant, even in cities, in all range states, and is relatively little traded. There have been some local declines in E of range from habitat loss.

Bibliography. Beebe (1916), Derks (1997), Desenne (1994), Desenne & Strahl (1991, 1994), Friedmann (1948b), Friedmann & Smith (1955), Haverschmidt & Mees (1994), Low (1972), Meyer de Schauensee & Phelps (1978), Pinto (1964), Ridgely (1981), Roth (1982), Sick (1985, 1993), Snyder (1966), Stotz *et al.* (1996), Tostain *et al.* (1992), Vriends (1979), Whitney (1996).

270. Tui Parakeet

Brotogeris sanctithomae

French: Toui à front d'or

German: Tuisittich

Spanish: Catita Frentigualda

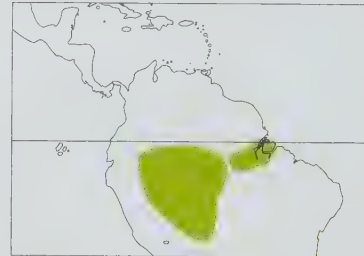
Taxonomy. *Psittacus St. Thomae* P. L. S. Müller, 1776, Island of St Thomas, substituted by "Brazilian Amazons".

Two subspecies recognized.

Subspecies and Distribution.

B. s. sanctithomae (P. L. S. Müller, 1776) - SE Colombia through Amazonian Brazil into NE & SE Peru and NE Bolivia.

B. s. takatsukasae Neumann, 1931 - lower Amazon basin, NC Brazil.



Descriptive notes. 17 cm; mean 59 g. Generally green, more yellowish below and on rump and tail; bluish tinge on face; lores and forehead yellow; primaries dark green, bluish below. Immature like adult. Race *takatsukasae* has yellow postocular streak.

Habitat. Primarily in secondary growth, lightly wooded grassland and dense scrub on swampy riverbanks, sandbars and islands, and at the edge of *várzea* forest along large rivers and lakes, also in clearings at a short distance from waterbodies.

Food and Feeding. Visits riverside palms (unripe fruit ignored) and *Erythrina* trees, often

taking their blossoms; also manioc and sugarcane plantations. Seen feeding on guaba (*Psidium*) fruits.

Breeding. Jul in Peru; evidence suggests Apr-Jul in Colombia, where nest-holes were noted in termitaria. Six different-sized nestlings reported in one nest. No other information.

Movements. Apparently sedentary.

Status and Conservation. Not globally threatened. CITES II. Locally abundant with very little habitat loss, Brazil, and equally common within the limited areas occupied in Colombia, Peru and Bolivia. Present in Manu National Park, Peru.

Bibliography. Allen (1995), Derks (1997), Harris (1992b, 1994a), Hilty & Brown (1986), Lever (1987), Low (1972), Novaes (1957), O'Neill (1974, 1981), Pearson (1975a), Pinto (1947, 1964), Ridgely (1981), Sick (1985, 1993), Stotz *et al.* (1996), Terborgh *et al.* (1984), Vriends (1979), Wheatley (1994), Whitney (1996).



Genus *NANNOPSITTACA* Ridgway, 1912

271. Tepui Parrotlet

Nannopsittaca panychlora

French: Toui des tépous

German: Tépousittich

Spanish: Cotorrita Tepui

Taxonomy. *Brotagerys* [sic] *panychlora* Salvin and Godman, 1883, Mount Roraima, Guyana. Forms a superspecies with *N. dachilleae*. Monotypic.

Distribution. Higher montane isolates in N, S & E Venezuela, S Guyana and N Brazil.



Descriptive notes. 14 cm; 42 g. Green, paler below; yellow area on chin, lores, under and behind eye; undertail-coverts and carpal yellowish; undersides of flight-feathers and tail bluish green. Female has less yellow. Immature undescribed.

Habitat. Cool humid subtropical forest ranging up to 2200 m, but also the lowlands around the tepuis.

Food and Feeding. Fruiting trees are visited; birds make daily altitudinal flights from higher parts of tepuis to forage in lowest reaches.

Breeding. No information.

Movements. Little known, but apparently seen irregularly and in large flocks at (what was at

least then) the one accessible site, possibly indicating some local nomadism. Also makes altitudinal movements on daily basis, for foraging.

Status and Conservation. Not globally threatened. CITES II. A BirdLife "restricted-range" species. Fairly common, with little habitat loss within its range, and very little trade.

Bibliography. Desenne & Strahl (1991, 1994), Forrester (1993), Low (1972), Mayr & Phelps (1967), McLoughlin (1981), Meyer de Schauensee & Phelps (1978), O'Neill *et al.* (1991), Olrog (1968), Ridgely (1981), Snyder (1966), Stotz *et al.* (1996), Wheatley (1994), Whitney (1996), Willard *et al.* (1991).

272. Amazonian Parrotlet

Nannopsittaca dachilleae

French: Toui de D'Achille

German: Amazonassittich

Spanish: Cotorrita Amazónica

Taxonomy. *Nannopsittaca dachilleae* O'Neill *et al.* 1991, 65 km east-north-east of Pucallpa, right bank of Río Shesha, Ucayali, Peru.

Forms a superspecies with *N. panychlora*. Monotypic.

Distribution. SE Peru and NW Bolivia, and probably adjacent W Brazil.



Descriptive notes. 14 cm; 38-46 g. Green, more yellowish on underparts; forehead, lores and crown pale powdery blue; chin greenish yellow; flight-feathers green on outer webs, dusky black on inner; bill and feet pinkish.

Habitat. Trees and natural secondary vegetation along rivers in lowland tropical forest; not seen in closed-canopy forest or areas disturbed by man. In Bolivia seen in river-edge trees including small *Calocophyllum spruceanum* and *Cecropia membranacea*.

Food and Feeding. Seeds of *Guadua* bamboo, ripe fruits of a *Coussapoa* vine, *Cecropia* catkins, *Vernonia* seeds and fruits or seeds of an

arboreal epiphytic cactus *Rhipsalis*.

Breeding. Apparent nest in hole in clump of epiphytes near top of a 25 m tree seen under inspection in Jul and Sept.

Movements. Nothing is known, but use of bamboo suggests degree of nomadism possible.

Status and Conservation. Not globally threatened. CITES II. Currently considered near-threatened. Common to abundant at type locality, and present in Tambopata Reserve and Manu National Park.

Bibliography. Allen (1995), Collar *et al.* (1994), Donahue (1994), O'Neill *et al.* (1991), Parker *et al.* (1991), Shuker (1993), Stotz *et al.* (1996), Wheatley (1994), Whitney (1996).

Genus *TOUIT* G. R. Gray, 1855

273. Lilac-tailed Parrotlet

Touit batavica

French: Toui à sept couleurs

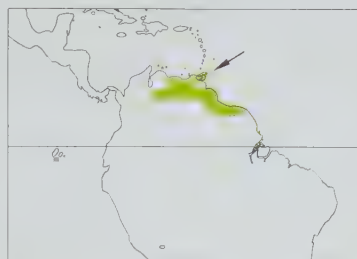
German: Siebenfarbenpapagei

Spanish: Cotorrita Sietecolores

Other common names: Seven-coloured Parrotlet

Taxonomy. *Psittaca Batavica* Boddaert, 1783, Batavia; error = Venezuela. Monotypic.

Distribution. N Venezuela (from Mérida) W to Trinidad and Tobago, Guyana, Surinam and French Guiana to the border with (and possibly in) Amapá, Brazil.



Descriptive notes. 14 cm; 52-72 g. Head yellow, ear-coverts and sides of neck green, nape scaled dusky; back and wings black with greater wing-coverts yellowish green edged green-blue, carpal red; tail purplish rose with black subterminal bar; throat and belly green, breast pale blue; underwing-coverts blue. Immature undescribed.

Habitat. Lowland deciduous forest extending into cloud-forest at 900-1700 m in W of range; elsewhere in undisturbed and disturbed primary forest, secondary forest, although on Trinidad coming to suburban area to roost in large eucalypt in garden.

Food and Feeding. Flowers, nectar, buds, berries, seeds and fruits, apparently mostly taken in the early morning.

Breeding. Fledgling found in Dec in Surinam; Jan-Mar on Trinidad. Nest in arboreal termitarium or hollow limb. Eggs 5-6.

Movements. Irregular wanderers in coastal regions, Surinam, and noted using Portachuelo Pass, Venezuela, Aug-Nov. Some form of movement also appears to occur on Trinidad.

Status and Conservation. Not globally threatened. CITES II. Relatively common on Trinidad. Considered heavily traded in Venezuela, but another source describes it as little kept in captivity owing to high mortality, perhaps related to diverse natural alimentary regime. Present in Henri Pittier National Park, Venezuela.

Bibliography. Belcher & Smooker (1936), Desenne & Strahl (1991, 1994), Fernández-Badillo *et al.* (1994), ffrench (1991), Haverschmidt & Mees (1994), Herklots (1961), Lentino & Portas (1994), Low (1972), Meyer de Schauensee & Phelps (1978), Murphy (1995), Ridgely (1981), Schäfer & Phelps (1954), Snyder (1966), Stotz *et al.* (1996), Tostain *et al.* (1992), Troncoso *et al.* (1995), Wheatley (1994), Whitney (1996).

274. Scarlet-shouldered Parrotlet

Touit huetii

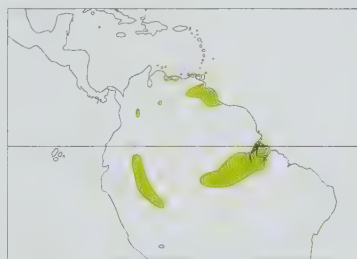
French: Toui de Huet

German: Schwarzstirnpapagei

Spanish: Cotorrita Alirroja

Taxonomy. *Psittacus huetii* Temminck, 1830, upper Amazonia. Monotypic.

Distribution. S & NE Venezuela and adjacent N Guyana, occasionally on Trinidad; disjunct in E Colombia; then from E Ecuador and E Peru to N Bolivia; and Amazonian Brazil from R Aripuanã E to R Tocantins, with a single record from Manaus. It is not known whether the apparent gaps in this range are genuine.



Descriptive notes. 15-16 cm; 58-62 g. Green, paler on underparts; front of face dark with white eye-ring, crown and nape olive brown; upperwing-coverts dark blue, primaries black, carpal, underwing-coverts and axillaries red; undertail-coverts yellow, uppertail green in centre, rest red. Female replaces red of tail with greenish yellow, tipped black. Immature like female but without dark face.

Habitat. Humid lowland, chiefly *terra firme* forest, but also seasonally flooded *várzea* forest, extending usually only to 900 m but at least occasionally up to 1300 m, and considered commoner in upper tropical forest, Peru; in

Venezuela near rivers.

Food and Feeding. No information.

Breeding. Evidence for Apr in S Venezuela; birds with young in N Mato Grosso (Rio Aripuanã), Brazil, indicated their having bred Sept-Dec. No other information.

Movements. Almost certainly nomadic in upper Amazonia, birds rarely being found in one area for more than a few weeks at a time, and records from N Mato Grosso are certainly of post-breeding visitors, apparently in wandering flocks. Flocks recorded on Trinidad in 1974, 1975, 1980.

Status and Conservation. Not globally threatened. CITES II. Although apparently uncommon to rare, this bird is highly unobtrusive and lives in remote areas, so may be commoner than records indicate; or it may be temporally patchy, reflecting nomadism (which might explain the large flocks reported in Guyana). If it is declining, this is likely to be for natural and not human-related reasons. Little trade recorded.

Bibliography. Allen (1995), Boesman (1995), Desenne & Strahl (1991, 1994), ffrench (1991), Hilty & Brown (1986), Low (1972), Meyer de Schauensee & Phelps (1978), O'Neill (1969, 1981), Parker & Remsen (1987), Parker *et al.* (1991), Pinto (1964), Ridgely (1980, 1981), Roth (1982), Sick (1985, 1993), Snyder (1966), Stotz *et al.* (1996), Whitney (1996).

275. Red-fronted Parrotlet

Touit costaricensis

French: Toui du Costa Rica

German: Costa-Rica-Papagei

Spanish: Cotorrita Costarricense

Other common names: Red-winged Parrotlet (when combined with *T. dilectissima*)

Taxonomy. *Urochroma costaricensis* Cory, 1913, near Puerto Limón, Costa Rica.

Sometimes treated as conspecific with *T. dilectissima*. Monotypic.

Distribution. Costa Rica to W Panama.

Descriptive notes. 17 cm; 80 g. Like *T. dilectissima* but forehead to mid-crown red, and subocular red patch more extensive, blue on face much diminished, throat yellowish. Female has less red on head and in wings. Immature has little or no red on head.

Habitat. Cool, very wet montane evergreen forest in the middle altitude subtropical belt and, seasonally, lowland rain forest; enters patchy secondary areas.

On following pages: 276. Blue-fronted Parrotlet (*Touit dilectissima*); 277. Sapphire-rumped Parrotlet (*Touit purpurata*); 278. Brown-backed Parrotlet (*Touit melanonota*); 279. Golden-tailed Parrotlet (*Touit surda*); 280. Spot-winged Parrotlet (*Touit stictoptera*); 281. Black-crowned Parrot (*Pionites melanocephala*); 282. White-bellied Parrot (*Pionites leucogaster*); 283. Vulturine Parrot (*Pionopsitta vulturina*); 284. Brown-hooded Parrot (*Pionopsitta haematotis*); 285. Rose-faced Parrot (*Pionopsitta pulchra*); 286. Orange-cheeked Parrot (*Pionopsitta barrabandi*).



habitat disturbance; apparently not traded.

Bibliography. Anon. (1983), Collar *et al.* (1994), Delgado (1985a), Eisenmann (1955), Hernández-Baños *et al.* (1995), Low (1972), Ridgely (1981), Ridgely & Gwynne (1989), Slud (1964), Stiles (1985), Stiles & Skutch (1989), Stotz *et al.* (1996), Taylor, K. (1993), Wetmore (1968), Whitney (1996).

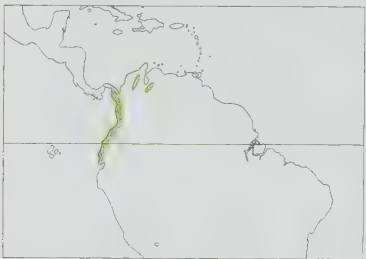
276. Blue-fronted Parrotlet

Touit dilectissima

French: Toui à front bleu **German:** Kronenpapagei **Spanish:** Cotorrita Cariazul
Other common names: Red-winged Parrotlet (when combined with *T. costaricensis*)

Taxonomy. *Urochroma dilectissima* P. L. Sclater and Salvin, 1871, south of Mérida, Venezuela. Sometimes treated as conspecific with *T. costaricensis*. Monotypic.

Distribution. E Panama through NE Colombia to W Venezuela, and S on Pacific slope to NW Ecuador.



in Venezuela.

Food and Feeding. Small fruits have been found in stomachs.

Breeding. Jun in Colombia; evidently May-Jun in Panama. Nest in arboreal termitarium.

Movements. Seasonal movements take birds into lowlands and up to 3000 m.

Status and Conservation. Not globally threatened. CITES II. Uncommon to rare; part of range in N Colombia now deforested, and suffers from habitat loss within a small range, Venezuela; however, much habitat remains, little trade exists, and it is relatively secure.

Bibliography. Butler (1979), Carriker (1959), Desenne & Strahl (1991, 1994), Dugand (1948), Hilty (1977), Hilty & Brown (1986), Low (1972), Meyer de Schauensee & Phelps (1978), Olivares (1957), Phelps & Phelps (1958), Ridgely (1981), Ridgely & Gwynne (1989), Stotz *et al.* (1996), Wetmore (1968), Whitney (1996).

277. Sapphire-rumped Parrotlet

Touit purpurata

French: Toui à queue pourprée **German:** Purpurschwanzpapagei **Spanish:** Cotorrita Purpurada

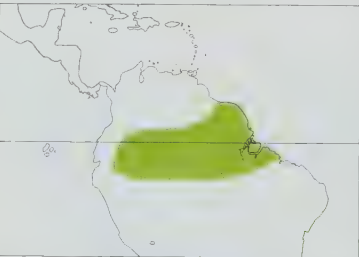
Taxonomy. *Psittacus purpuratus* J. F. Gmelin, 1788, Cayenne.

Two subspecies recognized.

Subspecies and Distribution.

T. p. viridiceps Chapman, 1929 - S Venezuela S from Cerro Duida into N Brazil on upper R Negro and W to SE Colombia, E Ecuador (one record) and NE Peru.

T. p. purpurata (J. F. Gmelin, 1788) - S Venezuela E from Cerro Duida through the Guianas to N Brazil, including lower R Negro, as far as Maranhão.



also savanna woodland, forest edge and inselberg borders in Guianas, and isolated woodlots in cleared terrain.

Food and Feeding. Recorded feeding on fruit of *Ficus*, *Clusia grandiflora*, *Pourouma guianensis* and trees of Sapotaceae and Myrtaceae.

Breeding. Mar in Venezuela; Apr and Nov in the Guianas; female excavating nest in Nov, Colombia. This nest was a hole in a dead tree in flooded forest; arboreal termitaria also used. Eggs reportedly 3-5.

Movements. Unknown.

Status and Conservation. Not globally threatened. CITES II. Uncommon, never in large numbers, but inconspicuous and therefore perhaps underrecorded. Several important reserves exist within its range, notably in Brazil, and the species appears never to have been traded. Some habitat loss may have affected numbers, although birds persist in partially cleared land.

Food and Feeding. Fruits from trees and epiphytes, including melastomes, ericads like *Cavendishia*, and *Clusia*.

Breeding. Probably breeds in dry season. Eggs probably 2-3, given family parties of 4-5.

Movements. Resident, but extensive altitudinal migrant, rising to 3000 m in dry season and descending sometimes to sea-level in wet.

Status and Conservation. Not globally threatened. CITES II. Currently considered near-threatened. A BirdLife "restricted-range" species. Uncommon to rare, although probably much overlooked and tolerant of a degree of

Bibliography. Desenne (1994), Desenne & Strahl (1991, 1994), Dugand & Borrero (1948), Friedmann (1948b), Haverschmidt & Mees (1994), Hilty & Brown (1986), Keller (1995), Low (1972), Meyer de Schauensee & Phelps (1978), Pinto (1964), Ridgely (1981), Sassi (1947), Sick (1985, 1993), Snyder (1966), Stotz *et al.* (1996), Tostain *et al.* (1992), Whitney (1996).

278. Brown-backed Parrotlet

Touit melanonota

French: Toui à dos noir **German:** Braunrückenpapagei **Spanish:** Cotorrita Dorsinegra
Other common names: Black-eared Parrotlet

Taxonomy. *Psittacus melanonotus* Wied, 1820, Brazil. Monotypic.

Distribution. E Brazil in Bahia (19th century), Rio de Janeiro and São Paulo.



Descriptive notes. 15 cm. Green, paler and brighter on face, darker on crown and upper-sides, but scapulars and back blackish brown; flanks bluish grey; lateral tail feathers red tipped black. Female has flanks duller. Immature undescribed.

Habitat. Humid forest, chiefly on lower montane slopes at 500–1000 m, even up to 1700 m, sometimes in rain forest and sand-plain forest at sea-level.

Food and Feeding. Fruits of *Rapanea acuminata*, seeds and berries.

Breeding. No information. Presumably Sept-Oct at start of rains, like most E Brazil

endemics.

Movements. Movements to lower levels may be seasonal in nature, and in the nineteenth century birds were thought to wander more widely in winter (Jun).

Status and Conservation. **ENDANGERED.** CITES II. A BirdLife "restricted-range" species. Generally rare within a very limited range, with habitat destruction continuing and the great majority of recent records coming from well scattered protected areas: Desengano State Park, Itatiaia National Park, Serra dos Órgãos National Park, Tijuca National Park and Pedra Branca State Park (Rio de Janeiro), Ubatuba Experimental Station, Serra do Mar State Park, Iguape Environmental Protection Area and Ilha do Cardoso State Park (São Paulo). Not known in trade.

Bibliography. Aleixo & Galetti (1997), Beissinger & Snyder (1992), Bertagnolli (1981), Collar (1996), Collar & Andrew (1988), Collar, Crosby & Stattersfield (1994), Collar, Gonzaga *et al.* (1992), Descourtiz (1983), Forrester (1993), King (1978/79), Low (1972), Pineschi (1990), Pinto (1938, 1946, 1964), Ribeiro (1920), Ridgely (1981), Scott & Brooke (1985), Sick (1969, 1985, 1993), Sick & Teixeira (1979), Stotz *et al.* (1996), Wege & Long (1995), Whitney (1996), Willis & Oniki (1981).

279. Golden-tailed Parrotlet

Touit surda

French: Toui à queue d'or **German:** Gelbschwanzpapagei **Spanish:** Cotorrita Sorda

Taxonomy. *Psittacus surdus* Kuhl, 1820, Brazil.

NE Brazilian population, if proven racially distinct, must be known as *chryseura* (Swainson, 1820), not *ruficauda* Berla, 1954. Monotypic.

Distribution. NE & E Brazil.



Descriptive notes. 16 cm. Green, brighter on undersides; yellow on forehead and face; scapulars olive brown; rump bluish; flight-feathers dusky brown; lateral tail feathers greenish yellow tipped black. Female tail tipped blackish. Immature undescribed.

Habitat. Lowland evergreen and sand-plain forest, and adjacent lower montane forest, reaching to 900 m.

Food and Feeding. Unripe fruits of *Spondias lutea* and ripe fruits of *Rapanea schwackeana* recorded, also those of a myrtaceous tree.

Breeding. No information. Presumably Sept-Oct at start of rains, like most E Brazil

endemics.

Movements. Some local or seasonal displacements: in Rio de Janeiro state, appears at Cabo Frio, Jun-Sept. and at Majé, Mar; in Ilha Bela State Park, only in "summer".

Status and Conservation. **ENDANGERED.** CITES II. Generally rare and likely to have suffered a major and continuing decline with steady clearance of final vestiges of lowland forest outside of protected areas. Recorded from Murici and Pedra Talhada Biological Reserves (Alagoas), Monte Pascoal National Park (Bahia), Córrego Grande, Sooretama and Augusto Ruschi Biological Reserves (Espírito Santo), Desengano State Park and Itatiaia National Park (Rio de Janeiro), Boracéia Biological Station, Fazenda Intervalos State Reserve, and Ilha Bela, Jacupiranga and Ilha do Cardoso State Parks (São Paulo). Trade appears to be very light.

Bibliography. Beissinger & Snyder (1992), Berla (1954), Collar (1996), Collar & Andrew (1988), Collar, Crosby & Stattersfield (1994), Collar, Gonzaga *et al.* (1992), Forrester (1993), Gonzaga (1986), King (1978/79), Low (1972), Pineschi (1990), Pinto (1935, 1964), Pinto & Camargo (1961), Ribeiro (1920), Ridgely (1981), Scott & Brooke (1985), Sick (1985, 1993), Sick & Teixeira (1979), Stotz *et al.* (1996), Wege & Long (1995), Whitney (1996).

280. Spot-winged Parrotlet

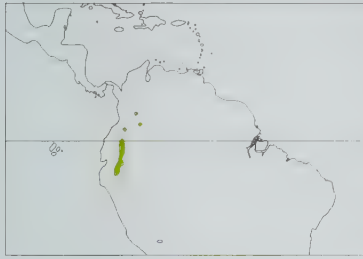
Touit stictoptera

French: Toui tacheté **German:** Tüpfelpapagei **Spanish:** Cotorrita Alipinta

Taxonomy. *Urochroma stictoptera* P. L. Sclater, 1862, Bogotá, Colombia.

Supposedly separate species listed as "*T. emmae*" was based on adult female of present species. Monotypic.

Distribution. S Colombia, Ecuador and N Peru.



Descriptive notes. 17-18 cm; 71-84 g. Green, paler on underparts; wings dusky brown, with whitish tips to coverts and two outer median coverts orange. Female has green wing-coverts with black bases. Immature similar.

Habitat. Tall humid montane forest at 500-2400 m (chiefly 1050-1700 m) in upper tropical and lower subtropical zone; recorded also from savanna-like habitat and, nearby, in stunted ridge-top forest, and possibly only in poor soil forests in Peru.

Food and Feeding. Fruit and seeds, including mistletoe; reportedly raids maize crops and sometimes feeds in *Ficus* and *Clusia* trees.

Breeding. Very circumstantial evidence for Mar in Ecuador; specimens in Jun and Oct-Nov had undeveloped gonads, and birds were in flocks at these times.

Movements. No evidence of wandering.

Status and Conservation. **VULNERABLE.** CITES II. Uncommon although probably unrecorded. Threatened by habitat destruction within apparently fragmented and disjunct range, especially in Colombia, but exploration of suitable habitat in E Ecuador and NE Peru needed to clarify status. Recorded from Serranía de la Macarena National Park (Colombia), and Cayambe-Coca Ecological Reserve, Sumaco and Cordillera de Cutucú Protection Forests, and Sangay National Park (Ecuador).

Bibliography. Beissinger & Snyder (1992), Blake (1962), Borrero (1958), Butler (1979), Chapman (1917), Collar (1996), Collar & Andrew (1988), Collar, Crosby & Stattersfield (1994), Collar, Gonzaga *et al.* (1992), Davis (1986), Dugand (1945a, 1945b), Hilty & Brown (1986), Low (1972), O'Neill (1981, 1987), Parker *et al.* (1982), Philipson *et al.* (1951), Ridgely (1980, 1981), Robbins *et al.* (1987), Stotz *et al.* (1996), Wege & Long (1995), Whitney (1996).

Genus *PIONITES* Heine, 1890

281. Black-crowned Parrot

Pionites melanocephala

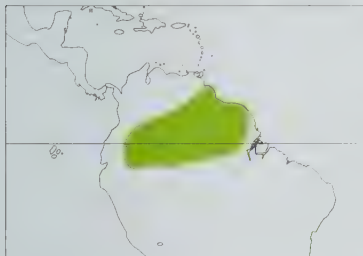
French: Caique maïpourri **German:** Grünzügelpapagei **Spanish:** Lorito Chirlecrés
Other common names: Black-headed Parrot/Caique

Taxonomy. *Psittacus melanocephalus* Linnaeus, 1758, Mexico: error = Caracas, Venezuela. Forms a parapatric species pair with *P. leucogaster*. Two subspecies recognized.

Subspecies and Distribution.

P. m. melanocephala (Linnaeus, 1758) - SE Colombia to NE Venezuela, the Guianas and Brazil N of Amazon.

P. m. pallida (Berlepsch, 1889) - S Colombia W & E of Andes S to E Ecuador and NE Peru.



Descriptive notes. 23 cm; 130-170 g. Forehead to nape black with rufous-orange band across hindneck; lores to below eye green; face, sides of neck and upper breast yellow; back and wings dull green with dark blue primaries and reddish orange axillaries; lower breast and belly creamy; thighs, flanks and vent apricot yellow; tail above green tipped yellow, below olive-yellow. Immature pale yellow on breast and belly. Race *pallida* has breast and belly whiter, hindneck band paler.

Habitat. Lowland humid tropical *terra firme* forest and seasonally flooded *várzea* forest, second growth and clearings, penetrating in

small numbers up to 1000 m in W of range.

Food and Feeding. Seeds of *Carapa densiflora*, *Hevea benthamiana*, *Guarea grandiflora*, *Pouroma guianensis* and *Micropholis mensalis*, pulp of *Dialium guianensis*, *Euterpe precatoria*, *Micropholis melinoneana* and *Cynometra hostmanniana*, seeds and pulp of *Clusia grandiflora*, flowers of *Eschweilera* and *Inga laterifolia*, and leaves of *Sterculia excelsa*. In dry season favours flowers of *Symphonia globulifera* and the *Norantea* liana.

Breeding. Apr-May in Venezuela and Colombia; Oct-Nov in Surinam; Dec-Feb in French Guiana. Nest is hole in tree. Eggs probably 2.

Movements. Nomadic in French Guiana in response to food availability.

Status and Conservation. Not globally threatened. CITES II. Generally common throughout range; vast areas of habitat remain. Little persecuted for international pet trade, but highly prized in Venezuela, where very common in captivity.

Bibliography. Desenne (1994), Desenne & Strahl (1991, 1994), Dugand & Borrero (1948), Friedmann (1948b), Haffer (1977b), Haverschmidt & Mees (1994), Hilty & Brown (1986), Low (1972), McLoughlin (1983), Meyer de Schauensee & Phelps (1978), Niceforo & Olivares (1966), Novaes (1981), O'Neill (1981), O'Neill & Pearson (1974), Polimore (1936), Pinto (1964), Ridgely (1981), Sick (1985, 1993), Snyder (1966), Stotz *et al.* (1996), Tostain *et al.* (1992), Traylor (1958), Whitney (1996).

282. White-bellied Parrot

Pionites leucogaster

French: Caique à ventre blanc **German:** Rostkappenpapagei **Spanish:** Lorito Rubio
Other common names: White-bellied Caique

Taxonomy. *Psittacus leucogaster* Kuhl, 1820, Brazil.

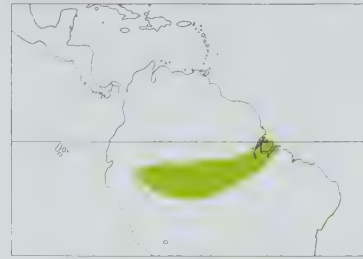
Forms a parapatric species pair with *P. melanocephala*. Three subspecies recognized.

Subspecies and Distribution.

P. l. xanthomeria (P. L. Slater, 1858) - E Peru and N Bolivia to W Brazil S of Amazon.

P. l. xanthurus Todd, 1925 - Brazil S of Amazon from R Purús and R Jurua to R Madeira.

P. l. leucogaster (Kuhl, 1820) - N Brazil from R Madeira to Maranhão.



Descriptive notes. 23 cm; mean 155 g. Forehead to nape orange; face, sides of neck and upper breast yellow; back and wings dull green with dark blue primaries and reddish orange axillaries; lower breast and belly white; flanks, thighs, rump and tail bright green; vent yellow. Immature has crown and nape brownish. Race *xanthurus* replaces bright green (including tail) with yellow (some intermediates); *xanthomeria* like *xanthurus* but with green tail.

Habitat. Lowland humid tropical *terra firme* forest, more particularly seasonally flooded *várzea* forest along watercourses, and possibly prefers margins and openings to continuous forest; penetrates drier forests in S of range, but not so common.

Food and Feeding. No specific information.

Breeding. Jan in E of range, where one nest found was in hollow in tree 30 m up, containing 2 eggs.

Movements. No information.

Status and Conservation. Not globally threatened. CITES II. Common in most of range and in parts of E Peru abundant, but suffering from habitat destruction in the E and SW, and possibly extinct in Santa Cruz, Bolivia, as a consequence. Present in Manu National Park, Peru, where density reaches 6 pairs/km². From 1980 to 1983 2475 birds were exported from Bolivia, but all trade stopped in 1984.

Bibliography. Allen (1995), Fry (1970), Haffer (1977b), Inskipp *et al.* (1988), Low (1972), Novaes (1981), O'Neill (1981), Parker *et al.* (1982), Pinto (1964), Polimore (1936), Remsen *et al.* (1986), Ridgely (1981), Sick (1985, 1993), Stotz *et al.* (1996), Terborgh, Fitzpatrick & Emmons (1984), Terborgh, Robinson *et al.* (1990), Wheatley (1994), Whitney (1996).

Genus *PIONOPSITTA* Bonaparte, 1854

283. Vulturine Parrot

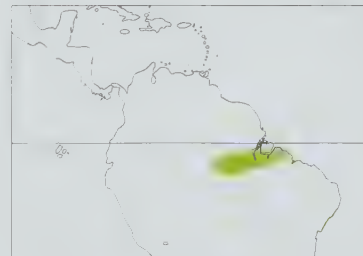
Pionopsitta vulturina

French: Caique vautourin **German:** Kahlkopfpapagei **Spanish:** Lorito Vulturino

Taxonomy. *Psittacus vulturinus* Kuhl, 1820, Brazil.

Commonly placed in genus *Gypopsitta*, on basis of bare head in adults, but this character is probably of little or no taxonomic significance; in other respects species clearly belongs in *Pionopsitta* and indeed may form a superspecies or parapatric species trio with *P. barrabandi* and *P. caica*. Monotypic.

Distribution. N Brazil S of Amazon from R Madeira E to Maranhão.



Descriptive notes. 23 cm; 138-165 g. Generally green; head bare, covered in bristles that match skin, with lores and base of lower mandible yellowish flesh, rest black; complete (feathered) collar yellow, bordered black on nape and sides of neck; breast olive yellow, lightly edged black; belly with some blue edges; lower thighs yellow; shoulder reddish orange; primaries black margined green; carpal edge and underwing-coverts red; tail with much yellow below, tipped dull blue above. Immature has feathered green head, yellowish around lores and eye; lacks yellow collar and black bordering.

Habitat. Occupies both dryland *terra firme* and seasonally flooded (*várzea*) forest.

Food and Feeding. No specific information. The bare head may be an adaptation to a particular large fruit whose juice mats feathers.

Breeding. No information.

Movements. No information.

Status and Conservation. Not globally threatened. CITES II. Uncommon within relatively small range, which is rapidly being cleared of forest in the E, where new forest reserves are sorely needed; present in Amazonia National Park in W of range. There is no known pressure from trade.

Bibliography. Forrester (1993), Low (1972), Olrog (1968), Pinto (1964), Ridgely (1981), Ruschi (1979), Sick (1985, 1993), Stone (1929), Stotz *et al.* (1996), Wheatley (1994), Whitney (1996).

284. Brown-hooded Parrot

Pionopsitta haematotis

French: Caique à capuchon **German:** Grauwangenpapagei **Spanish:** Lorito Encapuchado

Taxonomy. *Pionus haematotis* P. L. Slater and Salvin, 1860, Vera Paz, Guatemala.

Forms a parapatric species pair with *P. pulchra*, which has been regarded as conspecific. Two subspecies recognized.

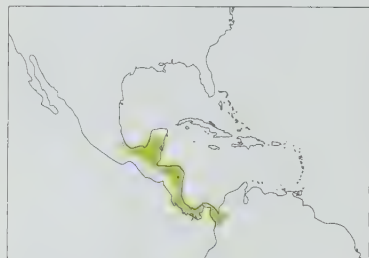
Subspecies and Distribution.

P. h. haematotis (P. L. Slater & Salvin, 1860) - SE Mexico through N Guatemala to W Panama.

P. h. coccinillarioris (Lawrence, 1862) - E Panama and NW Colombia.

Descriptive notes. 21-23 cm; 145-150 g. Reddish brown crown and ear-coverts with pinkish red auricular patch, with white nares and orbital ring; nape and breast dull olive yellow; flanks and axillaries red; rest of body green except blue on edge of wing, flight-feathers blackish blue, tail tipped blue with dull red basally on outer feathers. Immature has paler head with no auricular patch, breast greener. Race *coccinillarioris* has some pinkish red, sometimes forming a full band, below dark throat.

Habitat. Humid evergreen and cloud forest and borders, mature second growth, in lowlands and lower subtropical zone, regularly ranging up to 1200 m, perhaps less frequently up to 1900 m.



Food and Feeding. Fruits and seeds of various trees and epiphytes, e.g. *Ficus*, *Heliconia*, *Croton*, *Erythrina*, plus green leaves of certain mistletoes.

Breeding. Breeding condition birds taken in Feb in Mexico, May-Jul in Guatemala, and Aug in Panama. Nest in hole in tree. No further information.

Movements. Birds found above 1200 m thought perhaps to be seasonal migrants, but in Costa Rica breeding may occur on slopes up to 1600 m with a subsequent descent to lowlands.

Status and Conservation. Not globally threatened. CITES II. Although there must have been a decline from habitat loss, this bird is fairly common over much of range and suffers very little persecution even locally from trapping, and even though they are reported, perhaps rather surprisingly, to attack corn crops in Guatemala.

Bibliography. Binford (1989), Blake (1958), Clinton-Eitner *et al.* (1994), González-García (1993), Haffer (1975), Hilty & Brown (1986), Howell & Webb (1995a), Land (1970), Loetscher (1941), Low (1972), Monroe (1968), Paynter (1955), Ridgely (1981), Ridgely & Gwynne (1989), Russell (1964), Slud (1964), Stiles & Skutch (1989), Stotz *et al.* (1996), Thompson (1962), Wetmore (1944, 1968), Whitney (1996).

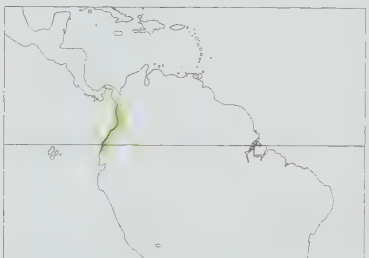
285. Rose-faced Parrot

Pionopsitta pulchra

French: Caique à joues roses **German:** Rosenwangenpapagei **Spanish:** Lorito Carirrosado
Other common names: Beautiful Parrot

Taxonomy. *Pionopsitta pulchra* Berlepsch, 1897. San José, Río Dagua, Colombia. Forms a parapatric species pair with *P. haematotis*, with which considered conspecific in past. Monotypic.

Distribution. Lowlands and foothills of W Colombia and NW Ecuador.



Descriptive notes. 23 cm. Like *P. haematotis* but large pinky rose facial area extending from lores, over eye to side of neck, paler on cheeks; also bend of wing orange and yellow, and no red on flanks and axillaries. Immature has rosy pink restricted mostly to ear-coverts, rest of face greenish.

Habitat. Wet forest, tall second growth, plantations and clearings with scattered trees, usually below 1200 m but locally to 2100 m.

Food and Feeding. Virtually unknown. Small fruit and cultivated bananas recorded.

Breeding. Jan-Mar in N of range, Nov-Dec in C. No further information.

Movements. Apparent local increases in numbers may be seasonal, but no clear information.

Status and Conservation. Not globally threatened. CITES II. A BirdLife "restricted-range" species. Uncommon and local, but sometimes fairly numerous and capable of doing damage to banana

crops. Forest remains within its range, but under intensifying logging pressure, notably in Ecuador. Apparently not traded.

Bibliography. Butler (1979), Haffer (1967, 1975), Hilty & Brown (1986), Kirwan & Marlow (1996), Low (1972), Marín & Carrión (1991), Olivares (1957), Ridgely (1981), Stotz *et al.* (1996), Taylor (1995a), Wheatley (1994), Whitney (1996), Williams *et al.* (1996).

286. Orange-cheeked Parrot

Pionopsitta barrabandi

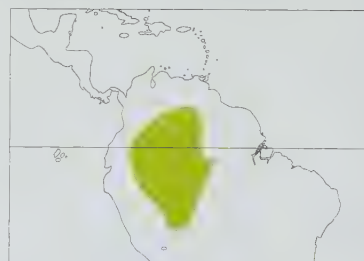
French: Caique de Barraband **German:** Goldwangenpapagei **Spanish:** Lorito Carinaranja
Other common names: Barraband's Parrot

Taxonomy. *Psittacus Barrabandi* Kuhl, 1820. Brazil.

May form superspecies or parapatric species trio with *P. caica* and *P. vulturina*. Two subspecies recognized.

Subspecies and Distribution.

P. b. barrabandi (Kuhl, 1820) - SW Colombia and S Venezuela to Brazil N of Amazon (E to R Negro). *P. b. aurantiigena* Gyldenstolpe, 1951 - E Ecuador, E Peru and N Bolivia to Brazil S of Amazon (E to R Madeira).



Descriptive notes. 25 cm; 165-190 g (mean also given as 140 g). Head black circumscribing large orange yellow malar patch and white bare orbital ring; throat and upper breast olive yellow; rest of body green, but with shoulder orange yellow, carpal edge and underwing-coverts red, primaries blackish, thighs yellow, tail tipped dull blue. Immature has head brown and olive, less orange and red in wing. Race *aurantiigena* has richer orange malar patch, shoulder and thighs.

Habitat. Like *P. caica* a bird of primary lowland *terra firme* forest, but sometimes also in seasonally flooded *várzea* forest, and sandy-

belt woodland; ranges up to only 500 m.

Food and Feeding. Seeds and fruits: of six food-plants, three were Moraceae (*Ficus*, *Pourouma* and *Pseudolmedia*), two Leguminosae (*Mimosa* and *Pithecellobium*), and one Olacaceae (*Heisteria*); figs, e.g. of *Ficus spheophylla* and another with larger fruit, clearly important. Seen biting leaf galls on *Pithecellobium* trees, presumably for wasp larvae.

Breeding. Probably Sept-Oct in E of range, based on immatures in Feb. No further data.

Movements. No information.

Status and Conservation. Not globally threatened. CITES II. Generally uncommon and local, but occasionally frequent to numerous in W parts of range, e.g. N Bolivia, this possibly related to scarcity of *Pionus menstruus* and *Amazona* species in the region. Present in Manu National Park, Peru, where density reaches 0.5 pairs/km². Habitat for this species is still very extensive and intact, despite encroachments from E and S, and trade is minimal.

Bibliography. Desenne & Strahl (1991, 1994), Gyldenstolpe (1951), Hilty & Brown (1986), Inskipp *et al.* (1988), Low (1972), Meyer de Schauensee & Phelps (1978), O'Neill (1981), Parker & Remsen (1987), Parker, Castillo *et al.* (1991), Parker, Parker & Plenge (1982), Phelps & Phelps (1958), Pinto (1964), Poulsen (1992), Remsen & Ridgely (1980), Ridgely (1981), Roth (1983), Sick (1985, 1993), Stotz *et al.* (1996), Terborgh *et al.* (1990), Whitney (1996).



287. Saffron-headed Parrot

Pionopsitta pyrrhila

French: Caique de Bonaparte **German:** Goldkopfpapagei **Spanish:** Lorito Cabecigualdo

Taxonomy. *Psittacula pyrrhila* Bonaparte, 1853, Río Hacha, Santa Marta, Colombia. Once considered sufficiently distinct to warrant its own genus *Pyrrhila*. Monotypic.

Distribution. E Panama through N & C Colombia to NW Venezuela.

Descriptive notes. 24 cm. Head including nape, sides of neck and chin yellow, stained red around and behind eyes, bare orbital ring white circled by brown extending onto lores and nares; breast olive, extending to form full collar; rest of body green, with yellow shoulders, red carpals and blackish primaries, red on flanks and underwing, plus yellow lower thighs and dusky blue tips to tail. Immature has green head, shoulders and carpal edge.

Habitat. Humid and wet forest, tall second growth and borders, in lowlands and foothills, regularly to c. 900 m, perhaps only seasonally into cloud forest up to 1650 m.

Food and Feeding. No information.

Breeding. Mar-Jun in Colombia. No further information available.

Movements. Higher elevation records may be seasonal in nature, and records from Pacific coast of Colombia as far S as Buenaventura may refer to nomads.

Status and Conservation. Not globally threatened. CITES II. Apparently uncommon over much of its range, and never very numerous. Although described as still well represented in several parts of Colombia, other reports suggest that it is now very rare throughout its range, with less than 10,000 birds remaining. Considerable habitat loss has occurred both historically and in modern times, and numbers must have declined over several centuries, apparently now gone from C Andes and from near Bogotá; habitat loss in Venezuela is a serious threat. Present on Cerro Pirre in Darién National Park, Panama. Apparently very little traded, even in recent times in Venezuela.

Bibliography. Delgado (1985a), Desenne & Strahl (1991, 1994), Haffer (1975), Hilty & Brown (1986), Low (1972), Meyer de Schauensee & Phelps (1978), Olivares (1969), Olrog (1968), Ridgely (1981), Ridgely & Gwynne (1989), Robbins *et al.* (1985), Stotz *et al.* (1996), Wetmore (1968), Wheatley (1994), Whitney (1996).

288. Caica Parrot

Pionopsitta caica

French: Caique à tête noire **German:** Kappenpapagei **Spanish:** Lorito Caica

Taxonomy. *Psittacus Caica* Latham, 1790, Cayenne.

May form a superspecies or parapatric species trio with *P. barrabandi* and *P. vulturina*. Monotypic.

Distribution. E Venezuela, the Guianas and N Brazil S to Amazon.

Descriptive notes. 23 cm; 121-143 g. Head brownish black, with bare orbital ring grey; fulvous collar with dark feather edges, producing scaled effect; throat and upper breast olive brown; rest of body green, with dull blue primary coverts, primaries blackish, tail tipped dull blue. Immature is much greener on head.

Habitat. Tall, primary *terra firme* forest and edge to 1100 m, rarely penetrating flooded forest or secondary growth.

Food and Feeding. Very few specific data. Seeds of *Dracoides sagotianum*, *Protium*, *Brosium*; once seen feeding on small dark red fruits.

Breeding. Nov-Jan in French Guiana. Nest in

hole in tree 10 m up (only record). No further information.

Movements. No information.

Status and Conservation. Not globally threatened. CITES II. Nowhere plentiful. Scarce throughout Surinam, very local in Venezuela, but little affected either by habitat loss or by trade. Common in interior French Guiana.

Bibliography. Desenne & Strahl (1991, 1994), Haffer (1970), Haverschmidt & Mees (1994), Low (1972), Meyer de Schauensee & Phelps (1978), Olrog (1968), Phelps & Phelps (1958), Pinto (1964), Ridgely (1981), Sick (1985, 1993), Snyder (1966), Stotz *et al.* (1996), Tostain *et al.* (1992), Wheatley (1994), Whitney (1996).

289. Pileated Parrot

Pionopsitta pileata

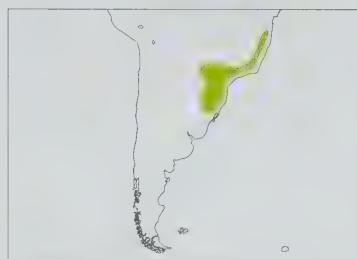
French: Caique mitré **German:** Scharlachkopfpapagei **Spanish:** Lorito Pileado
Other common names: Red-capped Parrot

Taxonomy. *Psittacus pileatus* Scopoli, 1769, south-eastern Brazil. Monotypic.

Distribution. SE Brazil, E Paraguay and N Argentina.

Descriptive notes. 22 cm; 98-120 g. Forehead, crown and lores to upper ear-coverts red, though extent of this rather variable; rest of body green, but becoming yellowish on abdomen, and with dull blue in primary coverts, primaries, edges to outer wing-coverts and tail feathers, and tail tips. Female lacks red on head, but has blue suffusion on forehead and breast. Immature male has reduced red on head, female reduced blue on wings.

Habitat. Mainly humid foothill forest up to 1500 m in N of range, extending into *Araucaria*-dominated and lowland formations in S, including partially cleared areas.



Food and Feeding. Virtually unknown. Fruits of *Podocarpus* and "cambuf", seeds of *Solanum mauricianum*, bark of *Eucalyptus*.

Breeding. Apparently Nov. Nest in hole in tree. Eggs 2, but 3-4 in captivity where incubation, by female only, lasted 24 days and nestling period 52-54 days.

Movements. Some movements between coastal and interior areas occur, with presence in Oct in Amambay, Paraguay; strikingly nomadic at Intervalles State Park, São Paulo.

Status and Conservation. Not globally threatened. CITES I. Currently considered near-threatened. Much reduced by extensive habitat

loss throughout range, but still persists in reasonable numbers where cover extensive, notably Paraná and adjacent states, Brazil; it remains common in the Alto Paraná region, Paraguay. There appear to be no recent records from Corrientes, Argentina, but still common in Misiones.

Bibliography. Aleixo & Galetti (1997), Belton (1984), Bertagnolio (1981), Brooks *et al.* (1993), Canevari *et al.* (1991), Chebez (1992), Contreras *et al.* (1990), Eckelberry (1965), Guix (1995), Harrison (1984), Hayes (1995), Low (1972), Lowen *et al.* (1996), Nores & Yzurieta (1994), de la Peña (1988), Pinto (1964), Pizo *et al.* (1995), Ridgely (1981), Robiller & Trogisch (1985a), do Rosário (1996), de Ruiter (1994b), Scherer-Neto & Müller (1983), Sick (1985, 1993), Smith (1977b), Stotz *et al.* (1996), Whitney (1996), Willis & Oniki (1981).

Genus *HAPALOPSITTACA* Ridgway, 1912

290. Black-winged Parrot

Hapalopsittaca melanotis

French: Caique à ailes noires **German:** Schwarzflügelpapagei **Spanish:** Lorito Alinegro
Other common names: Black-eared Parrot

Taxonomy. *Pionus melanotis* Lafresnaye, 1847, Bolivia.

Two subspecies recognized.

Subspecies and Distribution.

H. m. peruviana (Carriker, 1932) - C to S Peru.

H. m. melanotis (Lafresnaye, 1847) - CW Bolivia.



Descriptive notes. 24 cm. Green, more yellowish on underparts; frontal band and lores blue, crown tinged blue-grey; narrow bare skin round eye dark, surrounded by flesh-coloured feathering; ear-coverts black; unbroken but indistinct collar blue-grey; much black on folded wing, primaries mostly blue; tail tipped blackish blue. Immature undescribed. Race *peruviana* has ear-coverts buff, reduced blue collar.

Habitat. Patches of humid montane evergreen forest, cloud and elfin forest between 1740 and 3450 m, sometimes at the edge of cultivated land.

Food and Feeding. Berries taken in treetops, with a strong preference for mistletoes of the genus *Gaiadendron*.

Breeding. No information.

Movements. May be seasonal at higher altitudes; groups of up to 50 observed wandering between wooded patches, searching for fruiting mistletoes.

Status and Conservation. Not globally threatened. CITES II. A BirdLife "restricted-range" species. Locally common, sometimes occurring in fairly large flocks, but evidently scarcer in Peru than Bolivia.

Bibliography. Bond & Meyer de Schauensee (1943), Fjeldså & Krabbe (1990), Low (1972), O'Neill (1981), Olrog (1968), Parker *et al.* (1982), Remsen & T aylor (1989), Ridgely (1981), Stotz *et al.* (1996), Wheatley (1994), Whitney (1996), Whitney *et al.* (1994).

291. Rusty-faced Parrot

Hapalopsittaca amazonina

French: Caique à face rouge **German:** Zwergamazona **Spanish:** Lorito Amazonino

Taxonomy. *Psittacus amazoninus* Des Murs, 1845, Bogotá.

Forms superspecies with *H. fuertesi* and *H. pyrrhops*, and all three have commonly been considered conspecific. Three subspecies recognized.

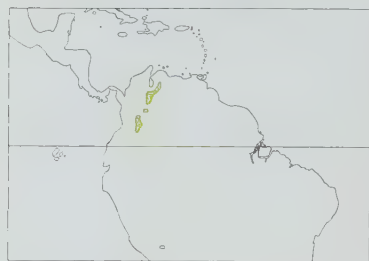
Subspecies and Distribution.

H. a. velezi Graves & Uribe Restrepo, 1989 - C Andes of Colombia.

H. a. amazonina (Des Murs, 1845) - E Andes of Colombia.

H. a. theresae (Hellmayr, 1915) - extreme E Colombia and NW Venezuela.

Descriptive notes. 23 cm; 97-115 g. Forehead and crown dull orange-red, lores yellow, extending below eye, base of lower mandible to chin orange-red, ear-coverts brownish red with yellow streaks radiating towards nape and down onto sides of neck; rest of upperparts green except for strong red shoulder patch, blue secondary coverts, dark primaries; breast buffy olive, rest of underparts grass green; tail dark red with blue-black to violet-blue tip. Immature has yellow streaks reduced, face duller red. Race *theresae* darker green above, with red on head



vertical displacements.

Status and Conservation. **ENDANGERED.** CITES II. A BirdLife "restricted-range" species. Generally rare throughout its range; the only site at which it was ever recorded as common, El Roble in Colombia (nominally *amazonina*) has long since been deforested, and total populations of all three races are likely to be low. Habitat clearance in Venezuela is proceeding rapidly, and two main protected areas where it occurs, El Tamá and Sierra Nevada National Parks, are themselves threatened; the species is also recorded from Páramos de Batallón y La Negra National Park (Venezuela) and Chingaza, Puracé and Cueva de los Guácharos National Parks (Colombia). Virtually unknown in trade.

Bibliography. Beissinger & Snyder (1992), Brockner (1997), Butler (1979), Carriker (1955), Chapman (1917), Collar (1996), Collar & Andrew (1988), Collar, Crosby & Stattersfield (1994), Collar, Gonzaga *et al.* (1992), Desenne & Strahl (1991), Fjeldsá & Krabbe (1990), Graves & Uribe (1989), Hilty & Brown (1986), Low (1972), Meyer de Schauensee & Phelps (1978), O'Neill (1981), Phelps & Phelps (1958), Ridgely (1981), Ridgely & Gaulin (1980), Stotz *et al.* (1996), Wege & Long (1995), Whitney (1996).

292. Indigo-winged Parrot

Hapalopsittaca fuertesi

French: Caïque de Fuertes

German: Fuertespapagei

Spanish: Lorito de Fuertes

Other common names: Fuertes's Parrot

Taxonomy. *Pionopsitta fuertesi* Chapman, 1912, Laguneta, Cauca, Colombia.

Forms superspecies with *H. amazonina* and *H. pyrrhops*, and all three have commonly been considered conspecific. Monotypic.

Distribution. C Andes of Colombia.



Descriptive notes. 24 cm. Very like *H. amazonina*, but red on face confined to area over bill and no yellow streaking; forehead and upper cheeks dull yellow; mid- to hindcrown blue; belly with dull red patch.

Habitat. Wet, epiphyte-rich temperate cloud forest including oaks *Quercus* at 2610-3490 m, the majority of records being at 2900-3150 m.

Food and Feeding. No information, but likely to share preference for mistletoes shown by congeners.

Breeding. No information.

Movements. Unknown, but altitudinal dis-

placements probably occur.

Status and Conservation. **CRITICALLY ENDANGERED.** CITES II. A BirdLife "restricted-range" species. Extremely rare, and only known from Alto Quindío Acaime and Cañón del Quindío Natural Reserves, where the largest group seen was 25; no record since 1992. Extensive deforestation coupled with competition from *H. amazonina velezi* may have caused it to have become so strictly confined. It has not been traded.

Bibliography. Beissinger & Snyder (1992), Chapman (1912, 1917), Collar (1996), Collar, Crosby & Stattersfield (1994), Collar, Gonzaga *et al.* (1992), Fjeldsá & Krabbe (1990), Graves & Uribe (1989), Hilty & Brown (1986), King (1978/79), Low (1972), Olrog (1968), Renjifo (1991), Ridgely (1981), Stotz *et al.* (1996), Wege & Long (1995), Wheatley (1994), Whitney (1996).

293. Red-faced Parrot

Hapalopsittaca pyrrhops

French: Caïque de Salvin

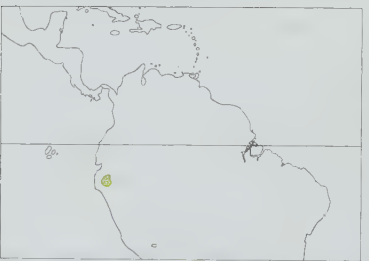
German: Salvinpapagei

Spanish: Lorito Ecuatoriano

Taxonomy. *Pionopsitta pyrrhops* Salvin, 1876, Santa Rita and San Lucas, Ecuador.

Forms superspecies with *H. amazonina* and *H. fuertesi*, and all three have commonly been considered conspecific. Monotypic.

Distribution. SW Ecuador to NW Peru.



Descriptive notes. 22 cm. Very like *H. amazonina* but entire area around bill orange red, extending in line above and behind eye; crown otherwise green, tinged blue; breast less olive; less blue on wing-coverts; tail dark blue, green at base; variable red patch on belly in some birds. Immature not known.

Habitat. Very wet upper montane cloud forest, forest patches and shrubbery at the páramo ecotone, 2500-3500 m.

Food and Feeding. *Miconia* fruits, *Viburnum* berries, *Weinmannia* shoots, flowers and seeds, *Clethra* flowers and pods, and parts of ericaceous trees *Cavendishia* and *Disterigma*.

Breeding. Oct-Jan, possibly also Aug. Nest in cavity in tree. Eggs 2, possibly sometimes 3.

Movements. Some seasonal or irregular displacements, possibly mainly altitudinal in nature, occur.

Status and Conservation. **ENDANGERED.** CITES II. A BirdLife "restricted-range" species. Very uncommon and local in Ecuador, where forest clearance almost total within its elevational range in

the Chilla Mountains; and rare (one locality) in Peru. Occurs at least seasonally in Sangay and Podocarpus National Parks, Cajas National Recreation Area and the adjacent Río Mazan Reserve, Ecuador.

Bibliography. Beissinger & Snyder (1992), Bloch *et al.* (1991), Chapman (1926), Collar (1996), Collar, Crosby & Stattersfield (1994), Collar, Gonzaga *et al.* (1992), Fjeldsá & Krabbe (1990), Flanagan & Galvez (1996), King (1989), Low (1972), Parker *et al.* (1985), Rasmussen *et al.* (1996), Ridgely (1980, 1981), Stotz *et al.* (1996), Toyne (1996), Toyne & Flanagan (1996), Toyne *et al.* (1995), Wege & Long (1995), Whitney (1996), Williams & Tobias (1994).

Genus *GRAYDIDASCALUS* Bonaparte, 1854

294. Short-tailed Parrot

Graydidascalus brachyurus

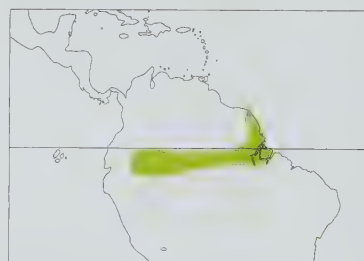
French: Caïque à queue courte

German: Kurzschwanzpapagei

Spanish: Lorito Colicorto

Taxonomy. *Psittacus brachyurus* Kuhl, 1820, Cayenne; error = upper Amazonia. Monotypic.

Distribution. SE Colombia, E Ecuador and E Peru through Amazon basin to NE French Guiana and Brazil N of Amazon Delta.



Descriptive notes. 24 cm; 188-233 g. Green, paler and more yellowish on underparts and uppertail-coverts; primaries darker green; wing-coverts edged yellow; short tail basally banded red on outer feathers; bill light green to olivaceous to dark grey; eye orange-red, with indistinct dark line in front and behind. Immature lacks red in tail.

Habitat. Seasonally flooded *várzea* forest and secondary growth in other swampy habitats on islands and in floodplains along larger rivers, edges of mangroves at coasts, penetrating man-made habitats at times (e.g. cultivations, with a record of a roost tree in a town street); low-

lands to 400 m.

Food and Feeding. Fruits including *Ficus*, cultivated guava (*Psidium guajava*), seeds, nuts, berries, in particular *Cecropia* catkins; tubers found in one stomach.

Breeding. Birds with partly developed gonads in Sept, E Brazil. No other information.

Movements. May be seasonal in some areas, this perhaps geared to flooding of habitat; in Loreto, E Peru, present Jun-Aug.

Status and Conservation. Not globally threatened. CITES II. Common, sometimes locally abundant, but becoming scarcer in upper reaches of rivers, presumably owing to restricted habitat. Little traded.

Bibliography. Gyldestolpe (1951), Hilty & Brown (1986), Low (1972), Novaes (1974), O'Neill (1981), O'Neill & Pearson (1974), Pinto (1964), Ridgely (1980, 1981), Schubart *et al.* (1965), Sick (1985, 1993), Smith (1978a), Stotz *et al.* (1996), Tostain *et al.* (1992), Wheatley (1994), Whitney (1996).

Genus *PIONUS* Wagler, 1832

295. Blue-headed Parrot

Pionus menstruus

French: Pioné à tête bleue

German: Schwarzohrpapagei

Spanish: Loro Cabeciazul

Other common names: Red-vented Parrot

Taxonomy. *Psittacus menstruus* Linnaeus, 1766, Surinam.

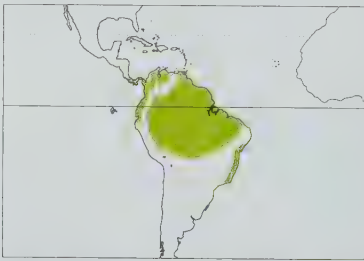
Three subspecies normally recognized.

Subspecies and Distribution.

P. m. rubrigularis Cabanis, 1881 - NE Costa Rica to N & W Colombia and W Ecuador.

P. m. menstruus (Linnaeus, 1766) - E Colombia, E Ecuador, E Peru and N Bolivia E to Venezuela, Trinidad and the Guianas, and through Amazonia to NE Brazil.

P. m. reichenowi (Heine, 1884) - E Brazil.



Descriptive notes. 24-28 cm; 209-295 g. Blue head and breast with blackish ear-coverts and some slight red flecking on throat; underparts green with some blue edging to feathers; undertail-coverts and bases of tail feathers red; remainder largely green. Immature largely without blue on head, and undertail-coverts yellowish green. Race *reichenowi* darker blue on head, with more blue in green plumage, no red on throat, paler bill, and strong golden wash on lesser and median upperwing-coverts; race *rubrigularis* has duller blue head and more obvious red on throat.

Habitat. Deciduous woodland including *cerrado*, humid and wet forest, mature second growth, seasonally flooded (*várzea*) and gallery forest, plantations, clearings and semi-open areas with scattered trees including *Mauritia* palm stands, ranging locally up to 1400 m.

Food and Feeding. Seeds of *Albizia*, *Anacardium*, *Caraipa*, *Dialium*, *Hevea*, *Hura*, *Clusia*, *Ocotea*, *Couroutaria*, *Inga*, *Brosimum*, *Tectona*, *Micropholis*, fruit of *Tetragastris*, *Inga*, *Ficus*, *Euterpe*,

sugary flowers of *Noranthea* liana, also of *Erythrina*; *Goupia*, *Pseudolmedia*, *Psidium*, *Mangifera* and *Pourouma* also mentioned. On Trinidad takes corn (*Zea mays*).

Breeding. Jan-May in Panama; Feb-Apr in Ecuador, Colombia and Venezuela; Mar and Oct on Trinidad; Oct and Jan-Feb in the Guianas; Jun-Jul, sometimes extended possibly through re-nesting into Nov in Mato Grosso. Nest in palm stub or hole of living or dead tree, in trunk or branch greater than 40 cm in diameter, 8-30 m from ground. Eggs 4; incubation by female. In captivity, incubation period lasts 24-29 days, with nestling period 55-60 days.

Movements. Movements occur in some regions, associated with new availability of food. Birds immigrate to islands off Panama after breeding, Jun. In some years in Surinam they arrive at the coast in Jul-Aug. and large nomadic flocks form in littoral forests in French Guiana.

Status and Conservation. Not globally threatened. CITES II. One of the most numerous parrot species in South America, common throughout its range in a variety of lowland wooded habitats. Commonly visit croplands and despoil maize and rice. Judged to have invaded Costa Rica this century, where range expanding rapidly on Pacific slope. Trade pressure relatively slight in spite of numbers of birds in wild.

Bibliography. Desenne (1994), Desenne & Strahl (1991, 1994), Eisenmann (1952), Fernández-Badillo *et al.* (1994), ffrench (1991), Friedmann (1948b), Galetti & Rodrigues (1992), Haffer & Fitzpatrick (1985), Haverschmidt & Mees (1994), Hilty & Brown (1986), Howell & Webb (1995a), Ingels (1978), Lantermann (1983), Lantermann & Wozniak (1986), Low (1972), Lowry (1991), Meyer de Schauensee & Phelps (1978), O'Neill (1981), Parker *et al.* (1982), Ridgely (1981), Ridgely & Gwynne (1989), da Rocha *et al.* (1988), Sick (1985, 1993), Slud (1964), Snyder (1966), Stiles & Skutch (1989), Stotz *et al.* (1996), Terborgh *et al.* (1984), Tostain *et al.* (1992), Toyne & Jeffcote (1994), Tyler (1979), Wetmore (1957, 1968), Whitney (1996).

296. Red-billed Parrot

Pionus sordidus

French: Pionne à bec rouge **German:** Duenenkopfpapagei **Spanish:** Loro Piquirrojo

Taxonomy. *Psittacus sordidus* Linnaeus, 1758, Mexico; error = Venezuela. Six subspecies recognized.

Subspecies and Distribution.

P. s. antelius Todd, 1947 - NE Venezuela.

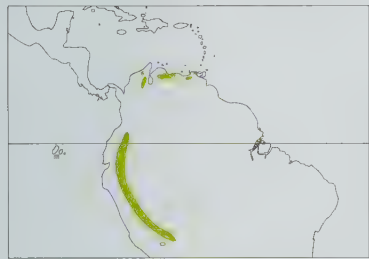
P. s. sordidus (Linnaeus, 1758) - N Venezuela.

P. s. ponsi Aveledo & Ginés, 1950 - NW Venezuela W to Santa Marta foothills in N Colombia.

P. s. saturatus Todd, 1915 - Santa Marta massif, N Colombia.

P. s. corallinus Bonaparte, 1854 - E Andes of Colombia S through E Ecuador and E Peru to N Bolivia.

P. s. mindoensis Chapman, 1925 - W Ecuador.



Descriptive notes. 28 cm; 272 g. Entire head dull green heavily edged dull blue; bare orbital ring greyish; bill red; upper breast dull blue, with blue scaling on green below, shading to pink-tinged buff-olive on belly; back, wings and tail olive green, latter with blue outer feathers; undertail-coverts and base of tail dull red. Immature green on head and breast, undertail-coverts yellowish green. Race *antelius* paler with little blue on breast; *saturatus* darker and *ponsi* darker still; *corallinus* larger and greener, mantle and back tinged grey and blue; *mindoensis* like *corallinus* but yellower.

Habitat. Humid and wet submontane and low-

land evergreen and semi-deciduous forest, cloud forest and gallery woodland, forest borders, secondary growth, coffee plantations and adjacent clearings, mostly at 500-1500 m, but range 100-2400 m.

Food and Feeding. No specific information; fruits and blossoms mentioned.

Breeding. Feb-Apr in Colombia; Apr in Venezuela; Jan-May in Ecuador; Oct in Bolivia. Nest in hole in tree, in one case 6 m from ground, once in 4 m high rotten stump. In captivity 3 eggs, and 3 nestlings recorded in wild; incubation lasts c. 27 days, nestling period 12 weeks.

Movements. Local movements occur in dry season at Rancho Grande, N Venezuela, but only when little wind, suggesting bird poorly adapted for long-distance daily displacements.

Status and Conservation. Not globally threatened. CITES II. Fairly common in most of range, perhaps less numerous in W Ecuador but one of commonest parrots at 2000 m in La Paz, N Bolivia. Forest clearance in Venezuela and Colombia will have caused long-term local declines and all three races in Venezuela are under pressure, and race *antelius* not found in recent survey of its much cleared habitat. Generally, however, the species persists in moderately disturbed habitat. Little traded anywhere.

Bibliography. Bond & Meyer de Schauensee (1943), Butler (1979), Desenne & Strahl (1991, 1994), Fernández-Badillo *et al.* (1994), Fjeldsá & Krabbe (1990), Harrison & Holyoak (1970), Hilty & Brown (1986), Inskipp *et al.* (1988), Lentino & Portas (1994), Low (1972), Meyer de Schauensee & Phelps (1978), Niethammer (1953), O'Neill (1981), Parker *et al.* (1982), Remsen & Traylor (1989), Ridgely (1981), Stoodley (1978a), Stotz *et al.* (1996), Toyne & Jeffcote (1994), Whitney (1996).

297. Scaly-headed Parrot

Pionus maximiliani

French: Pionne de Maximilien **German:** Maximilienpapagei **Spanish:** Loro Choclero

Taxonomy. *Psittacus Maximiliani* Kuhl, 1820, Viçosa on the Rio Peruhype, south of Caravellas, Bahia. Four subspecies recognized.

Subspecies and Distribution.

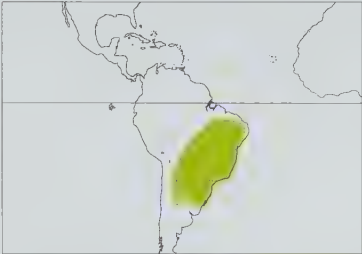
P. m. maximiliani (Kuhl, 1820) - NE & CE Brazil.

P. m. siy Souancé, 1856 - SE Bolivia, Paraguay, CW & CS Brazil and N Argentina.

P. m. lacerus (Heine, 1884) - NW Argentina in Tucumán, E Catamarca and S Salta.

P. m. melanoblepharus Miranda-Ribeiro, 1920 - SE Brazil, E Paraguay and N Argentina in Misiones.

Descriptive notes. 25-29 cm; 233-293 g. Forehead and mid-crown blackish brown offsetting white half-rings above and below eye, rest of head, nape and upper back dark greenish bronze with dark edging to feathers giving scaled effect, but with lower back and wings dull green with less intense edging; throat and upper breast dull blue shading into yellowish green; undertail-coverts and tail red basally with blue outer and green central feathers. Immature has paler green head, less blue on



breast. Race *melanoblepharus* larger and darker green with darker blue breast and dark orbital skin; *siy* like *melanoblepharus* with reddish purple chin and throat, and white orbital skin; *lacerus* like *siy* but larger with more intense and extensive blue on breast.

Habitat. Evergreen and semideciduous forest and open scrub woodland, favouring deciduous and gallery formations in the N and W of range such as *caatinga* and Chaco, and more humid ones in SE, including *Araucaria* forest; disturbed areas with scattered groves; regularly up to 1500 m in Brazil and 2000 m in W Argentina.

Food and Feeding. In one forest, 38 plant species from 18 families, with legumes (Fabaceae, notably *Erythrina*, Mimosaceae, notably *Inga* and *Piptadenia*, and Caesalpinaceae, notably *Copaifera*) comprising 41% of feeding bouts, supported by Euphorbiaceae, notably *Croton* and *Pachystroma*; seeds made up 70% of the diet, flowers 20%, corn 8% and fruit pulp 2%. Outside this study, figs and *Araucaria* nuts only specific foods recorded.

Breeding. Oct in Paraguay; Nov in São Paulo. Nest a hole in tree. In captivity: 4-5 eggs; nestling period of 9 weeks.

Movements. Resident.

Status and Conservation. Not globally threatened. CITES II. Although relatively infrequent in N reaches of range, common from Bahia southwards, reaching high densities in certain areas of São Paulo state. Patchily common in Paraguay and Argentina. Some reduction in numbers in SE Brazil from habitat loss. Traded in probably unsustainable volume out of Argentina in mid-1980's, with 67,851 birds exported in period 1981-1990, of which 25,596 in 1985 alone. Despite general ban in Argentina in 1986 this species continued to be traded in thousands, though on a steadily diminishing scale.

Bibliography. Anon. (1993), Belton (1984), Canevari *et al.* (1991), Chebez (1992), Contreras *et al.* (1990), Darrieu (1983b), Dorge (1996), Eisentraut (1935), Galetti (1993), Galetti & Rodrigues (1992), Guix (1995), Hayes (1995), Inskipp *et al.* (1988), Lantermann & Wozniak (1986), Low (1972), Naumburg (1930), Nores & Yzurieta (1994), de la Peña (1988), Pinto (1946, 1964), Pizo *et al.* (1995), Ridgely (1981), do Rosário (1996), Short (1975), Sick (1985, 1993), Smith (1960), Stotz *et al.* (1996), Tell (1983), Wetmore (1926), Whitney (1996), Willis & Oniki (1981).

298. Speckle-faced Parrot

Pionus tumultuosus

French: Pionne pailletée **German:** Purpurstirnpapagei **Spanish:** Loro Tumultuoso

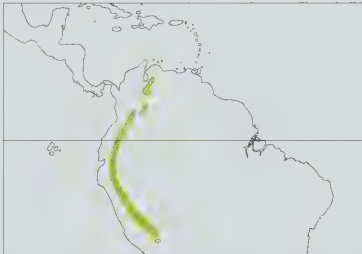
Other common names: Plum-crowned Parrot (*tumultuosus*); White-capped/White-headed Parrot (*seniloides*)

Taxonomy. *Psittacus tumultuosus* Tschudi, 1844, Peru. Race *seniloides* often regarded as a separate species, but differences between them slight and superficial, appearing more appropriate for subspecific separation. Two subspecies recognized.

Subspecies and Distribution.

P. t. seniloides (Massena & Souancé, 1854) - W Venezuela through CE Colombia and N Ecuador to NW Peru.

P. t. tumultuosus (Tschudi, 1844) - C & S Peru and mountains of Bolivia E to Santa Cruz.



Descriptive notes. 29-30 cm; 229 g. Forehead and crown plum; bare orbital ring greyish; face flecked plum-pink on dull purple, which extends onto breast; back, wings and belly green; undertail-coverts and tail basally dull red, rest of tail green, blue on outer feathers. Immature has crown and breast green, tail-coverts yellowish green. Race *seniloides* replaces plum with pink-flecked white on forehead shading into faint whitish scaling on purplish nape and sides of face; belly dull brown.

Habitat. Humid subtropical forests and tall cloud forest with bamboo thickets, elfin forest and wooded ravines in páramo at 2000-3000

m, occasionally ranging into adjacent agricultural land.

Food and Feeding. Virtually undocumented. Fruits of *Turpinia paniculata* and a member of Clusiaceae. Visits to maize fields occur and damage may once (when birds more numerous) have been considerable.

Breeding. Nov-Dec (*tumultuosus*). Details apparently unrecorded in either race in wild. In captivity: 4 eggs; incubation period c. 26 days.

Movements. Nomadic, especially in N of range, with seasonal variations in numbers.

Status and Conservation. Not globally threatened. CITES II. Generally uncommon and local. Overall status difficult to judge owing to nomadism, but nominate *tumultuosus* regarded as more numerous than *seniloides*, perhaps because the drier forests of former's habitat tend to produce more fruit than the wet ones used by latter. Moreover, deforestation in N of range more extensive and decline probable in most of range; habitat destruction a major threat to Venezuelan populations, but common in Loja, S Ecuador. Very little trade internationally.

Bibliography. Bond & Meyer de Schauensee (1943), Desenne & Strahl (1991, 1994), Fjeldsá & Krabbe (1990), Hilty & Brown (1986), Low (1972, 1995e), Meyer de Schauensee & Phelps (1978), O'Neill (1981), O'Neill & Parker (1977), Peters & Griswold (1943), Remsen & Traylor (1989), Ridgely (1981), Ridgely & Gaulin (1980), Smith, G.M. (1993), Stoodley (1978a), Stotz *et al.* (1996), Wheatley (1994), Whitney (1996).

299. White-crowned Parrot

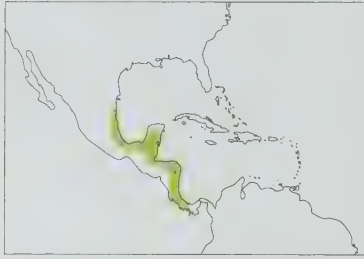
Pionus senilis

French: Pionne à couronne blanche **German:** Glatzenkopfpapagei **Spanish:** Loro Senil

Other common names: White-capped Parrot(!)

Taxonomy. *Psittacus senilis* Spix, 1824, Vera Cruz, Mexico. Populations from Belize and adjacent parts of Yucatán S to Panama formerly awarded race *decoloratus*. Monotypic.

Distribution. NE Mexico S, mainly on Caribbean slope, to W Panama.



Descriptive notes. 24 cm; 193-229 g. Lores, forehead and mid-crown white; bare orbital ring flesh yellow; face and nape dark green finely edged blue; upper breast patch white; remainder of undersides green thickly edged blue, less so on abdomen; undertail-coverts and tail basally red, tail otherwise green with blue outer feathers; back green; wing-coverts green edged buff; primaries dark blue. Female somewhat duller. Immature has reduced or no white.

Habitat. Humid tropical evergreen forest, pine-oak woodland and cloud forest, pine savanna, riverine forest, semi-open areas and clearings, plantations and agricultural areas

with scattered groves, generally ranging up to 1600 m, even 2300 m in Guatemala.

Food and Feeding. Fruits, seeds and nuts such as ripening seeds of *Inga*, *Erythrina*, palms and *Dendropanax*.

Breeding. Mar in Mexico; Feb-May in Belize, and probably also Guatemala; Jan-Apr in Costa Rica. Nest in hole in tree or, probably by preference, in palm stub. Eggs 3-6; in captivity, incubation, by female only, lasted 26-28 days, and nestling period 54-68 days.

Movements. Unclear patterns reported in Mexico, where in one winter (1950) all records were at 1250-1560 m and in the next all were at 160-300 m; and birds disappeared from a site in Oaxaca for a five-week period in Feb-Mar 1961. In Costa Rica a sporadic visitor, especially after breeding, to Valle Central.

Status and Conservation. Not globally threatened. CITES II. Generally common, perhaps reaching maximum abundance in Costa Rica, where even in urban outskirts. Possibly now extinct in W Nicaragua owing to extensive habitat loss, and naturally rare at edge of range in Panama. There are no reports of persecution for the damage they are reported to do to maize, sorghum and cultivated fruit, and trade is surprisingly low, with 6413 birds (85% of total volume) exported from Honduras, 1985-1990, since when Honduras has banned commerce in the species.

Bibliography. Anon. (1993), Binford (1989), Clinton-Eitner (1982a), Edwards & Lea (1955), González-García (1993), Harrison & Holyoak (1970), Howell, S.N.G. & Webb (1995a), Howell, T.R. (1964), Huber (1933), Land (1970), Loetscher (1941), Low (1972), Lowery & Dalquest (1951), Monroe (1968), Paynter (1955), Ridgely (1981), Ridgely & Gwynne (1989), Russell (1964), Slud (1964), Stiles & Skutch (1989), Stotz *et al.* (1996), Tashian (1952), Wetmore (1968), Whitney (1996), Zimmerman (1982, 1983).

300. Bronze-winged Parrot

Pionus chalcopterus

French: Pione noire

German: Glanzflügelpapagei

Spanish: Loro Alibronceado

Taxonomy. *Psittacus chalcopterus* Fraser, 1841, Bogotá, Colombia.

Proposed race *cyaneus*, from S Colombia to Peru, very weakly marked and doubtfully valid. Monotypic.

Distribution. W Venezuela and NE Colombia S through Ecuador to NW Peru.

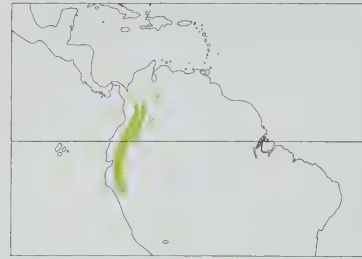
Descriptive notes. 28-29 cm; 210 g. Head and neck bronze-brown to very dark navy blue with bare orbital ring flesh, bill yellow, and chin flecked white with pink scaly bib below on deep blue undersides; back, mantle, scapulars and wing-coverts bronze; lower back, rump, flight-feathers and tail deep blue; undertail-coverts and tail basally dull red. Immature has head and upperparts greenish, underparts browner.

Habitat. Humid foothill and highland cloud forest, borders, partially cleared areas with scattered trees, penetrating drier deciduous woodland in S of range; mostly 1400-2400 m, though as low as 120 m in N of range, and up to 2800 m.

Food and Feeding. Poorly documented. Seen feeding on fruits of *Guazuma ulmifolia* and flushed from fruiting *Ficus*; small seeds also recorded.

Breeding. Mar-May in Colombia. Nest in hole in dead tree. In captivity: 2 eggs; incubation 26 days; and nestling period around 2 months.

Movements. Nomadic at least in Colombia, where populations on W slope of E Andes and E slope of W Andes disappear for major portions of the year. In Peru there may be immigration in the wet season, Dec-Apr.



Status and Conservation. Not globally threatened. CITES II. Although at least recently locally common in SW Colombia and W Ecuador, on "Blue List" for former and threatened in latter by rapid forest loss, and less numerous in rest of range where substantial declines must already have occurred in response to extensive habitat clearance. Population in Tumbes National Forest, NW Peru, may only be a few hundred and probably less than 500 occur in the country at any one time. Little traded internationally, but under some pressure in Venezuela.

Bibliography. Attrill (1991), Ball (1993), Butler (1979), Desenne & Strahl (1991, 1994), Fjeldså & Krabbe (1990), Harrison & Holyoak (1970), Hilty (1985), Hilty & Brown (1986), Inskipp *et al.* (1988), Low (1972, 1976), Meyer de Schauensee & Phelps (1978), O'Neill (1981), Parker, Parker & Plenge (1982), Parker, Schulenberg *et al.* (1995), Pulido (1991), Ridgely (1981), Ridgely & Gaulin (1980), Stoodley (1974), Stotz *et al.* (1996), Whitney (1996), Yezp (1953).

301. Dusky Parrot

Pionus fuscus

French: Pione violette

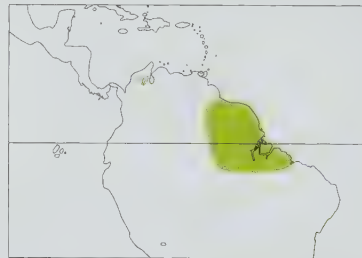
German: Veilchenpapagei

Spanish: Loro Morado

Taxonomy. *Psittacus fuscus* P. L. S. Müller, 1776, Cayenne.

Monotypic.

Distribution. NE Venezuela, the Guianas and N Brazil to lower Amazon at Manaus and E to Maranhão; also the Perijá range on Colombia-Venezuela border.



Descriptive notes. 25-26 cm; 179-229 g. Head slaty blue, with small indistinct red patch below nares and pale bluish grey bare orbital ring; face fringed with indistinct ring of white; upperparts dark brown with paler edging to feathers; underparts variably dark, typically tending to be reddish chocolate, with diffuse barring; undertail-coverts and base of tail dull red; rest of tail and wings dark blue. Immature similar to adult but with wing-coverts edged green.

Habitat. Inhabits humid tropical evergreen *terra firme* forest and, to a lesser extent, seasonally flooded *várzea* and permanently

flooded *igapó* forest, mostly below 600 m; seasonally penetrates sand-ridge forest and savanna woodland in N of range in Surinam, while in French Guiana it is commoner in coastal gallery woodland than in the interior forests. In Perijá range, humid foothill and lower highland forest and edge at 1200-1800 m.

Food and Feeding. Very poorly documented. Seeds of *Eschweilera subgrandulosa* and *Micropholis melinoneana* recorded.

Breeding. Apr in Colombia; Mar-Apr in Guyana; Feb in French Guiana; Nov in Pará, N Brazil. Nest in hole in dead tree. Eggs 4.

Movements. In Surinam birds visit coastal area Jun-Aug.

Status and Conservation. Not globally threatened. CITES II. Fairly common throughout range, and only likely to have declined in area in S and E of range in response to widespread habitat clearance in region; certainly reported as abundant in Pará in 1910's, clearly less so now. Very little evidence of local or international trade involving Venezuela and Guyana.

Bibliography. Desenne (1994), Desenne & Strahl (1991, 1994), Harrison & Holyoak (1970), Haverschmidt (1963), Haverschmidt & Mees (1994), Hilty & Brown (1986), Low (1972), Meyer de Schauensee & Phelps (1978), Niles (1981), Noegel & Moss (1984), Pinto (1953, 1964), Ridgely (1981), da Rocha *et al.* (1988), Sick (1985, 1993), Snyder (1966), Stotz *et al.* (1996), Tostain *et al.* (1992), Whitney (1996).

ssp leucocephala

inches 6
cm 16

PLATE 54

ssp saltuensis

♂

305

ssp albifrons

♀

304

302

ssp caymanensis

303

ssp bahamensis

309

310

307

308

306

ssp lilacina

ssp salvini

ssp autumnalis

ssp diadema

312

313

311

314

315

316

317

ssp bodini

ssp festiva



Genus *AMAZONA* Lesson, 1830

302. Cuban Amazon

Amazona leucocephala

French: Amazone de Cuba **German:** Kubaamazonen **Spanish:** Amazona Cubana
Other common names: Cuban Parrot, White-headed Amazon/Parrot

Taxonomy. *Psittacus leucocephalus* Linnaeus, 1758, eastern Cuba. Forms superspecies with *A. collaria* and *A. ventralis*, and all may be conspecific. Birds of I of Pines formerly awarded race *palmarum*. Four subspecies recognized.

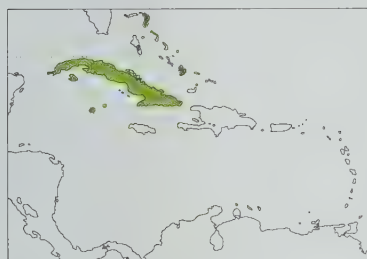
Subspecies and Distribution.

A. l. bahamensis (Bryant, 1867) - Bahamas, on Great Inagua and Abaco.

A. l. leucocephala (Linnaeus, 1758) - Cuba and I of Pines.

A. l. caymanensis (Cory, 1886) - Grand Cayman I.

A. l. hestern Bangs, 1916 - Cayman Brac and formerly Little Cayman.



Descriptive notes. 32 cm; 222-232 g. Forehead, crown and area round eyes white, including bare white periorbital ring; lores, cheeks and throat pinkish red; ear-coverts blackish; purplish patch on belly; remainder of body green with dark edging making scaled effect (also on belly patch); flight-feathers soft blue; tail green tipped yellowish, outer feathers with red basally and margined blue. Immature less strongly scaled, less purple on belly. Race *caymanensis* has white on mid-crown, pinkish red on moustachial area and belly patch all reduced; *hestern* smaller, with larger belly patch; *bahamensis* often with no belly patch,

white of crown more extensive below and behind eye.

Habitat. Limestone forest, dry mixed broadleaf woodland, savanna with stands of pine *Pinus caribaea* and palms, mangroves, plantations and gardens.

Food and Feeding. Fruits and/or seeds of wide variety of plants, notably unripe *Pinus caribaea*, plus *Bursera*, *Ficus*, *Petitia*, *Smilax*, *Sabal*, *Duranta*, *Exothea*, *Ernodia*, *Ilex*, *Zamia*, *Tabebuia*, *Acacia*, *Metopium*, *Tetrazygia*, *Myrcanthes*, *Coccoloba*, *Conocarpus*, *Swietenia*, *Manilkara*, *Cupania*, *Lysiloma*, and several palms; also stems of *Cassytha* vines, *Avicennia* and *Bucida* blossoms, and buds, plus cultivated fruit such as mango and papaya.

Breeding. Mar-Jun. Nest in hole in tree, e.g. *Avicennia* mangrove and various palms; on Abaco in limestone holes in ground. Eggs 2-6; incubation 26-28 days; nestling period 56-60 days.

Movements. No information, but some wandering outside the breeding season likely on Cuba.

Status and Conservation. Not globally threatened. CITES I. Currently considered near-threatened. Still common in remoter forested areas of Cuba and present in some national parks, but population declining from habitat loss and estimated at 5000 in 1988. Formerly present on several islands in Bahamas and on Little Cayman; causes of extinction there unknown. Population rise of *caymanensis* on Grand Cayman from 1500 in 1992 to 1900 in 1995, possibly owing to protection from hunting, but habitat still under pressure. Population on Cayman Brac 299-430 in 1991. Population on I of Pines 1384 in Dec 1995. Great Inagua population receives some protection from 743 km² Bahamas National Trust Park; Abaco population 830-1082 in 1989, threatened by cat predation, trade, poaching and habitat loss, though these recently the target of controls.

Bibliography. Anon. (1983, 1995e), Atrill (1981), Barbour (1943), Beissinger & Snyder (1992), Berovides (1986), Bond (1985), Boosey (1957), Bradley (1986), Brudenell-Bruce (1975), Brykezyński (1985), Buden (1987), Carraway & Carraway (1979), Decoteau (1983), Dorge (1997), Fitzgerald & Larson (1989), Gálvez-Aguilera (1997), Gálvez-Aguilera & Berovides-Álvarez (1997), Garrido & Schwartz (1968), Gnam (1987, 1988a, 1988b, 1990a, 1990b, 1991a, 1991b, 1994), Gnam & Burchsted (1991), Gnam & Rockwell (1991), Gnam *et al.* (1997), González *et al.* (1987), King (1976, 1978/79), Llanes *et al.* (1992), Low (1972, 1987c, 1994b, 1996b), McGrath & Greenwell (1978), Mitchell & Wells (1997), Moore (1985), Nichols (1981a), Noegel (1974, 1975, 1976, 1977, 1979a, 1979c, 1981), Parkes (1963), de las Pozas & González (1984a, 1984b), Rodríguez & Acosta (1986), Silva (1995), Snyder, King & Kepler (1982), Snyder, Wiley & Kepler (1987), Stoodley (1980), Stoodley & Stoodley (1990), Stotz *et al.* (1996), Sulley & Sulley (1992), Them (1995), Weissweiler (1987), Whitney (1996), Wiley (1991b), Wiley *et al.* (1992).

303. Yellow-billed Amazon

Amazona collaria

French: Amazone sasabé **German:** Jamaikaamazonen **Spanish:** Amazona Jamaicana Piquiclara
Other common names: Yellow-billed Parrot



Taxonomy. *Psittacus collaris* Linnaeus, 1758, Jamaica.

Forms superspecies with *A. leucocephala* and *A. ventralis*, and all may be conspecific. Monotypic.

Distribution.

Descriptive notes. 28 cm. Similar to *A. leucocephala* but with scaled effect confined to head and nape, and with white of mid-crown replaced with dull blue, ear-coverts greyish blue. Immature like adult.

Habitat. Mid-level wet limestone forest to 1200 m, but ranging down to sea-level and into semi-wooded areas and cultivations.

Food and Feeding. Fruits, seeds, blossoms and leaf buds, species including *Cecropia*, *Ficus*, *Annona*, *Citrus* and *Rubus*, plus cultivated fruit crops.

Breeding. Mar-May. Nest in hole in tree, frequently breadnut (*Brosimum*) but often in old woodpecker cavity; rarely below 18 m. Eggs 3-4; incubation 24-25 days; nestling period c. 10 weeks.

Movements. Birds wander more widely on a daily basis than sympatric *A. agilis*.

Status and Conservation. Not globally threatened. CITES II. Currently considered near-threatened. A BirdLife "restricted-range" species. Slowly decreasing as habitat steadily cleared, but still in reasonable numbers.

Bibliography. Anon. (1983), Arman & Arman (1983a, 1983b), Bond (1985), Cook *et al.* (1984), Cruz (1974), Cruz & Gruber (1981), Danforth (1928), Decoteau (1983), Downer (1976), Downer & Sutton (1990), Fairbairn (1981), Gruber (1980), Hurst (1982), Lack (1976), Low (1972, 1994b), Moffat (1972), Snyder *et al.* (1987), Stoodley & Stoodley (1990), Stotz *et al.* (1996), Varty (1991), Wauer (1996), Whitney (1996), Wiley (1991b).

304. Hispaniolan Amazon

Amazona ventralis

French: Amazone d'Hispaniola **German:** Häitiamazone **Spanish:** Amazona de la Española
Other common names: Hispaniolan Parrot

Taxonomy. *Psittacus ventralis* P. L. S. Müller, 1776, Martinique; error = Hispaniola.

Forms superspecies with *A. leucocephala* and *A. collaria*, and all may be conspecific. Monotypic. **Distribution.** Hispaniola, occurring in both Haiti and Dominican Republic; also on satellite islands. Introduced to Puerto Rico and US Virgin Is.



Descriptive notes. 28 cm. Similar to *A. leucocephala* but with pinkish red of lower face and throat reduced to a few flecks on throat, otherwise replaced by green; scaled effect also reduced, and white restricted to forecrown and lores, bordered by blue suffusion; belly patch maroon; ear-coverts blackish or dark blue. Immature lacks blue suffusion on crown and cheeks, belly patch paler.

Habitat. Arid lowland palm savanna and more humid montane evergreen forest, to 1500 m.

Food and Feeding. Fruits and seeds of palms, cacti, *Caesalpinia* and guava (*Psidium*), with cultivated plants such as bananas

and maize commonly also taken.

Breeding. Feb-May. Nest in hole in tree, commonly a woodpecker hole in palm trunk; also in cactus. Eggs 2-4; in captivity, incubation c. 25 days, and nestling period 8 weeks.

Movements. Daily feeding movements may be pronounced. No other information.

Status and Conservation. Not globally threatened. CITES II. Currently considered near-threatened. A BirdLife "restricted-range" species. Subject to highly variable reports on status, having undergone a decline throughout Hispaniola owing to habitat clearance, poaching for food, trapping for trade and shooting as a crop pest; however, still locally common although mostly uncommon to rare.

Bibliography. Almonte & Hierro (1996), Anon. (1983), Bacelar (1980), Bond (1985), Decoteau (1983), Dod (1981, 1987, 1992), Gates (1971), Jeggo (1981), Lever (1987), Low (1972, 1994b), Raffaele (1989), Robiller & Trogisch (1984a), Schwartz (1970a), Silva (1982), Snyder *et al.* (1987), Stoodley & Stoodley (1990), Stotz *et al.* (1996), Wauer (1996), Wetmore & Swales (1931), Whitney (1996), Wiley (1991b), Wiley *et al.* (1976).

305. White-fronted Amazon

Amazona albifrons

French: Amazone à front blanc **German:** Weißstirnamazone **Spanish:** Amazona Frentialba
Other common names: White-fronted Parrot

Taxonomy. *Psittacus albifrons* Sparrman, 1788, south-western Mexico.

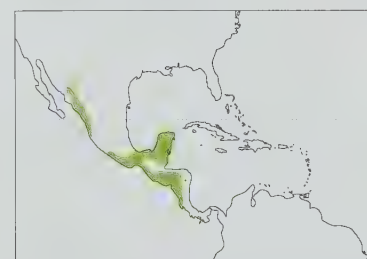
Three subspecies recognized.

Subspecies and Distribution.

A. a. saltuensis Nelson, 1899 - NW Mexico.

A. a. albifrons (Sparrman, 1788) - S Mexico and SW Guatemala.

A. a. nana W. DeW. Miller, 1905 - E Mexico, Belize and N Guatemala SE to W Costa Rica.



Descriptive notes. 25-29 cm; 176-242 g. Forecrown white; large facial patch around eye red; mid- to hindcrown dull blue with feather edges dark creating scaled effect; lower cheeks emerald green, shading to yellower green underparts, with dark scaling on breast fading out on belly; upperparts green with dark scaling; large red patch on leading edge of wing, with dark blue speculum and blue tips to flight-feathers; tail green with yellow tips and red bases to outer rectrices. Female lacks red in wing. Immature with reduced red on face. Race *saltuensis* washed glaucous; *nana* smaller.

Habitat. Chiefly drier, deciduous forest, advanced second growth, scrubby woodland, thornbush, coastal palm-fig thickets, semi-open areas with scattered trees and giant cacti, woodlots in savanna, mangroves and agricultural land, in lowlands and foothills to 1850 m; also in lowland evergreen forest and pinelands. Where sympatric with *A. xantholara*, inhabits wetter, more closed vegetation.

Food and Feeding. Seeds, including *Inga* and other legumes, *Croton*, *Terminalia*, plus blossoms, berries, fruits, notably of *Ficus* and cacti such as *Pachycereus* and *Lemaireocereus*; also corn, mangoes and other crops.

On following pages: 306. Yellow-lored Amazon (*Amazona xantholara*); 307. Black-billed Amazon (*Amazona agilis*); 308. Puerto Rican Amazon (*Amazona vittata*); 309. Tucuman Amazon (*Amazona tucumana*); 310. Red-spectacled Amazon (*Amazona pretrei*); 311. Red-crowned Amazon (*Amazona viridigenalis*); 312. Lilac-crowned Amazon (*Amazona finschi*); 313. Red-lored Amazon (*Amazona autumnalis*); 314. Blue-cheeked Amazon (*Amazona dufresniana*); 315. Red-browed Amazon (*Amazona rhodocorytha*); 316. Red-tailed Amazon (*Amazona brasiliensis*); 317. Festive Amazon (*Amazona festiva*).

Breeding. Jan-May in Mexico and Guatemala. Nest in natural cavities in trees and woodpecker holes. Eggs 3-5; incubation in captivity, by female only, 24 days.

Movements. Local seasonal movements occur, presumably as rain makes fringe habitats temporarily attractive: spring and summer visitor to arid lowlands, El Salvador; summer (Jul-Aug) visitor lower mountains, E Guatemala.

Status and Conservation. Not globally threatened. CITES II. Frequent to abundant, and with *Aratinga canicularis* the most numerous parrot on Pacific slope of Middle America, with no obvious decline, and indeed may benefit from habitat fragmentation. Possibly a crop pest in parts of range. Fairly heavily traded at least in Mexico.

Bibliography. Berlanga & Castillo (1989), Berman (1984), Binford (1989), Chapman *et al.* (1989), Clarke (1982), Davis (1944), Decoteau (1983), Dickey & van Rossem (1938), Howell & Webb (1995a), Inskipp *et al.* (1988), Land (1970), Lantermann (1984), Lever (1987), Levinson (1979, 1981), Lewis (1971, 1972), Low (1972), Monroe (1968), Muschellik & Stegweit (1985), Orians (1969), Paynter (1955), Ridgely (1981), van Rossem (1945), de Ruiter (1993a), Russell (1964), Short (1974), Skeate (1984, 1985), Slud (1964), Stiles & Skutch (1989), Stoodley & Stoodley (1990), Stoitz *et al.* (1996), Thurber *et al.* (1987), Wetmore (1944), Whitney (1996).

306. Yellow-lored Amazon

Amazona xantholora

French: Amazone du Yucatan **German:** Goldzügelamazone **Spanish:** Amazona Yucateca
Other common names: Yellow-lored Parrot, Yucatan Amazon/Parrot

Taxonomy. *Chrysotis xantholora* G. R. Gray, 1859, Honduras. Monotypic.

Distribution. Yucatán Peninsula in S Mexico (including Cozumel I) and N Belize; possibly also Roatán I, Honduras.



Descriptive notes. 26-28 cm; 200-232 g. Very like *A. albifrons* but with lores yellow, white of forehead extending to mid-crown, large black patch on ear-coverts, red in wing restricted to primary coverts. Female replaces white on head with dull blue, and has reduced red on face, ear-coverts dark grey, primary coverts green. Immature has red in face still further reduced.

Habitat. Open, dry vegetation, deciduous scrub forest and pine woodlands, and margins of humid forest. Occurs up to 100 m.

Food and Feeding. No certain information; probably similar to *A. albifrons*.

Breeding. Mar-Apr. Nest in hollow in tree, e.g. top of dead stump. Eggs 4; incubation 22-23 days. **Movements.** Large flocks fly across from mainland to Cozumel I every day in order to feed, returning to mainland in evening to roost.

Status and Conservation. Not globally threatened. CITES II. Common to abundant in most of restricted range, becoming rarer at periphery. Little trade recorded. Status of habitat on Mexican part of Yucatán, and on Cozumel, needs clarification.

Bibliography. Berlanga & Castillo (1989), Clinton-Eitner (1982b), Decoteau (1983), Griscom (1926), Howell & Webb (1992, 1995a), Klaas (1968), Low (1972), Monroe (1968), Paynter (1955), Ridgely (1981), Russell (1964), Stoodley & Stoodley (1990), Stotz *et al.* (1996), Sweeney (1997c), Whitney (1996).

307. Black-billed Amazon

Amazona agilis

French: Amazone verte **Spanish:** Amazona Jamaicana Piquioscura
German: Rotspiegelamazone
Other common names: Black-billed Parrot

Taxonomy. *Psittacus agilis* Linnaeus, 1758, Jamaica. Monotypic.

Distribution. Jamaica.



Descriptive notes. 25 cm; 178 g. Green, paler on underparts and yellowish green on undertail-coverts; often red flecks on forehead; feather edges on nape dark, giving slight scaled effect; primary coverts red, primaries soft blue, darker at tips, secondaries green and distally dark blue; tail green, outer feathers with red basally and margined blue. Female has some primary coverts green. Immature has all primary coverts green.

Habitat. Wet mid-level limestone forest generally at 500-1600 m.

Food and Feeding. Fruit, seeds, nuts, berries, blossoms and leaf buds, species including *Cecropia*, *Ficus*, *Annona*, *Nectandra*, *Bryophyllum*, *Pithecellobium*, *Melia* and *Blighia*; also cultivated plants such as papaya, mango, cucumber and maize.

Breeding. Mar-May. Nest at least 18 m up in hollow limbs or holes in trees, sometimes old woodpecker holes and bases of bromeliads. Eggs 2-4, usually only 2 young being reared; incubation by female, in captivity lasting 28 days; nestling period (wild) around 8 weeks.

Movements. Temporary local shifts in populations have been found to occur in response to food availability.

Status and Conservation. **VULNERABLE.** CITES II. A BirdLife "restricted-range" species. Formerly considered as common as sympatric *A. collaria*, but now less so and has become very rare in E. Forest clearance and fragmentation, hurricane damage to habitat, poaching for food and trapping for local trade are causing a decline in a population thought to number well under 10,000 mature individuals.

Bibliography. Anon. (1983), Bond (1985), Collar (1996), Collar *et al.* (1994), Cook *et al.* (1984), Cruz (1972, 1979, 1980), Cruz & Gruber (1981), Decoteau (1983), Downer & Sutton (1972, 1990), Fairbairn (1981), Gruber (1980), Kidd (1964, 1965), Knox & Knox (1974), Lack (1976), Low (1972, 1994b), Noegel (1979b, 1980), Salmon (1972), Stoodley & Stoodley (1990), Stotz *et al.* (1996), Tenison (1963), Varty (1991), Wauer (1996), Whitney (1996), Wiley (1991b).

308. Puerto Rican Amazon

Amazona vittata

French: Amazone de Porto Rico

Spanish: Amazona Portorriqueña

German: Puerto-Rico-Amazone

Other common names: Puerto Rican Parrot

Taxonomy. *Psittacus vittatus* Boddaert, 1783, Santo Domingo = Puerto Rico.

Race *gracilipes* of Culebra I, off Puerto Rico, now extinct. One extant subspecies recognized.

Subspecies and Distribution.

A. v. vittata (Boddaert, 1783) - Puerto Rico.



Descriptive notes. 29 cm; 250-300 g. Green, paler on underparts, with feathers edged blackish to give scaled appearance on head, mantle and breast; frontal band red, sometimes extending to lores; bare orbital ring white; belly sometimes tinged dull red; flight-feathers soft blue; tail green tipped yellowish, outer feathers with red basally and margined blue. Immature similar. Race *gracilipes* smaller.

Habitat. Originally throughout forests on Puerto Rico ranging from moist montane forest down to littoral scrub forest and mangroves; now confined to former, at 200-600 m, consisting (ascending order) of tabonuco

Dacryodes excelsa forest, once important for feeding and breeding but much logged, palo colorado *Cyrtilla racemiflora* zone, important for nesting, sierra palm *Prestoea montana* forest, to whose fruiting breeding is timed to coincide, and dwarf forest, used occasionally for food.

Food and Feeding. Fruits, seeds, leaves, flowers and bark of up to 60 food-plants (44 tree species, 7 shrubs and 7 vines) recorded, with *P. montana* most important and *Dacryodes* second; tends to avoid small fruits, favouring species that show pronounced peaks. Crop pest on corn in past century.

Breeding. Feb-Apr. Nest in natural cavities produced by decay, almost always in *Cyrtilla*, optimally at least 4-5 m from ground and at least 60 cm deep, dry and flat-bottomed; formerly also in potholes in limestone cliffs. Eggs 2-4; incubation, by female only, 26 days; nestling period averages 9 weeks, but variable.

Movements. Mostly sedentary; when formerly widespread, probably visited mangroves and littoral scrub forest mostly seasonally.

Status and Conservation. **CRITICALLY ENDANGERED.** CITES I. A BirdLife "restricted-range" species. Clearance of forest in 19th century was so intensive that less than 1% of Puerto Rico's forests were virgin by 1912, when the species's current only site, Luquillo Forest, occupied only around 22.7 km². Collection of birds as pets and persecution for crop depredation greatly reduced numbers in past; the race *gracilipes* was reportedly wiped out by settlers protecting harvests. Ill-founded translocation attempts in 1950's and deliberate radiation exposure of Luquillo Forest in 1960's may have reduced by then already low numbers. Hurricanes (notably Hugo in 1989) cause fatalities. Although rats appear to cause few problems, introduced honeybees occupy nest-sites, bot-flies (*Philornis pici*) parasitize nestlings, and increasing Pearly-eyed Thrashers (*Margarops fuscatus*) destroy nest contents. Attempts have been made to mitigate all these factors through a long-term programme of intensive management, which includes captive breeding and projected restocking of known former areas. Wild population increased from 21-23 after Hugo in 1989 to 42 in late 1994 and c. 60 in 1996, possibly related to greater fruit production in the recovering forest, new nest-site availability and the forced discovery of new breeding areas when birds were dispersed by the winds.

Bibliography. Anon. (1983), Beissinger & Snyder (1992), Biaggi (1983), Bond (1985), Brock (1991), Brock & White (1993), Christian, Lacher *et al.* (1996), Collar (1996), Collar & Andrew (1988), Collar, Crosby & Stattersfield (1994), Collar, Gonzaga *et al.* (1992), Decoteau (1983), Gertler *et al.* (1987), Greenway, J.C. (1967), Herzog (1995, 1996), Horn (1985), Jeggo (1981), King (1978/79, 1986), Lacy *et al.* (1989), Layton (1986), Lindsey, G.D. (1992), Lindsey, G.D. & Arendt (1991), Lindsey, G.D., Arendt & Kalina (1994), Lindsey, G.D., Arendt, Kalina & Pendleton (1991), Lindsey, G.D., Brock & Wilson (1989), Low (1972, 1987c, 1994b), Meyers, J.M. (1994, 1996), Meyers, J.M. & Barrow (1992), Meyers, J.M., Arendt & Lindsey (1996), Meyers, J.M., Vilella & Barrow (1993), Nickins (1995), Polerecky (1996), Raffaele (1989), Rodríguez-Vélez (1995), Rodríguez-Vidal (1959, 1962), Snyder (1978), Snyder & Taapken (1978), Snyder *et al.* (1987), Stoodley & Stoodley (1990), Stotz *et al.* (1996), Tomosy (1989), Vélez-Valentín (1994), Vilella & Arnizaut (1994), Wadsworth *et al.* (1982), Whitney (1996), Wiley (1981, 1983, 1985a, 1985b, 1991b), Wiley & Gee (1981), Wilson, K.A. (1993), Wilson, K.A. *et al.* (1995), Wilson, M.H. *et al.* (1994), Zwank & Layton (1989).

309. Tucuman Amazon

Amazona tucumana

French: Amazone de Tucuman

German: Tucumanamazone

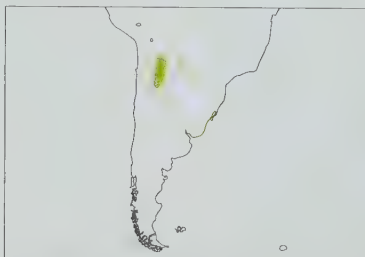
Spanish: Amazona Tucumana

Other common names: Tucuman Parrot, Alder Amazon/Parrot

Taxonomy. *Chrysotis tucumana* Cabanis, 1885, Tucumán, Argentina.

Sometimes considered conspecific with *A. pretrei*, but the two are better regarded as forming a superspecies. Monotypic.

Distribution. S Bolivia (no records since 1938) and NW Argentina.



Descriptive notes. 31 cm; 250-280 g. Green throughout, with feathers strongly edged black to give scaled effect; forehead and sometimes lores red, bare orbital skin white; lower thighs orange-yellow; undertail-coverts yellowish; primary coverts red; primaries tipped dark blue; tail tipped yellowish. Immature has all-green thighs.

Habitat. Open mountain woodland in Andean yungas forest dominated by pure stands of *Alnus acuminata* or *Podocarpus parlatorei*, 1600-2600 m.

Food and Feeding. Seeds of *Alnus* and possibly of *Podocarpus* are probably the virtual year-round staple. Flowers of *Erythrina* and *Morus*, late Aug, immature fruits of *Cedrela*, Sept-Nov.

Breeding. Nov-Jan. Nest in holes in wide old trunks of *Alnus* and *Podocarpus*. Eggs 4; incubation period, in captivity, 26-27 days.

Movements. Chiefly elevational in character, with birds moving to 500 m and lower in the Chaco-yungas transition zone, mid-Aug to Oct.

Status and Conservation. Not globally threatened. CITES I. A BirdLife "restricted-range" species. Generally uncommon but common locally. Present in winter in several protected areas, Argentina, including El Rey National Park. Causes some damage to fruit crops during winter, and is vulnerable to trapping at that season, when entire local populations concentrate at roosts; 18,641 birds were exported, 1985-1989, after which no trade was permitted under CITES. Fully protected (including prohibition of export) in Bolivia since 1984, though no records in wild since 1938.

Bibliography. Babarskas *et al.* (1995), Beissinger & Snyder (1992), Bond & Meyer de Schauensee (1943), Canevari *et al.* (1991), Decoteau (1983), Fjeldså & Krabbe (1990), Hoy (1968), Inskipp *et al.* (1988), Krabbe *et al.* (1996), Low (1972), Mosa *et al.* (1992), Noegel (1982a, 1982b), Nores & Yzurieta (1994), de la Peña (1988), Remsen & Traylor (1989), Ridgely (1981), Stoodley, J. & Stoodley (1990), Stoodley, P. & Stoodley (1983), Stotz *et al.* (1996), VanDerHeyden (1991), Vasicek (1993), Wetmore (1926), Wheatley (1994), Whitney (1996).

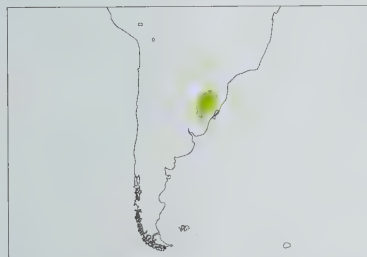
310. Red-spectacled Amazon

Amazona pretrei

French: Amazone de Prêtre **German:** Prachtamazone **Spanish:** Amazona Charao
Other common names: Red-spectacled Parrot

Taxonomy. *Psittacus pretrei* Temminck, 1830, Mexico?; error = southern Brazil. Sometimes considered conspecific with *A. tucumana*, but the two are better regarded as forming a superspecies. Monotypic.

Distribution. S Brazil chiefly in Rio Grande do Sul; very rare or vagrant in Paraguay and Argentina.



Descriptive notes. 32 cm. Similar to *A. tucumana*, but red on head extends to mid-crown and around bare orbital skin, often with some flecks on ear-coverts and neck; rest of head lacks dark feather-edging; red in folded wing extends from shoulders to primary coverts; lower thighs mixed with red. Immature has reduced red on head and wings.

Habitat. *Araucaria angustifolia* forest in N of range, lowland riverine broadleaf forest in S, with extensive seasonal use of *Podocarpus lambertii* groves. Major breeding area appears to be in savanna region in SE of range, in open woodland dominated by *Podocarpus*, *Lythraea*,

Scutia, *Celtis*, *Allophylus*, *Eugenia*, *Schinus* and *Sebastiania* species.

Food and Feeding. Variety of fruit in spring and summer (Oct-Feb), notably *Cupania*, *Eugenia*, *Phytolacca*, *Allophylus*, *Nectandra*, *Ocotea*, *Campomanesia*, *Cytharexylum*, *Myrcianthes*, *Blepharocalyx*, *Ficus* and *Symplocos*, with some populations heavily exploiting *Podocarpus* in Jan-Feb; in late autumn and winter (May-Aug) birds concentrate on seeds of *Araucaria*.

Breeding. Sept-Dec. Nest in hole in tree, generally fairly low (mean 6-5 m from ground); *Nectandra*, *Ocotea*, *Cupania* and *Sebastiania* are commonest nest-tree species. Eggs 2-4; incubation in captivity 26-27 days; fledging from as early as 50 days.

Movements. Partial migrant: birds breeding in SE and some in NC parts of range move to NE of range and into Santa Catarina in winter, straggling to E Paraguay. Fruit production in *Araucaria* is reported to be cyclically variable, and in periods of poor seed production birds probably wander much more widely during May-Aug.

Status and Conservation. ENDANGERED. CITES I. A BirdLife "restricted-range" species. Formerly abundant, but major decline over 20th century in response to destruction and fragmentation of habitat compounded by trade at national level. Collectors usually remove all nestlings, cutting and often destroying nests in process; this now probably major threat to species. Despite the presence of many protected areas within the species's range, none is adequate either in staffing levels or in size. Wild population in early 1990's estimated at 7500-8500 birds.

Bibliography. Beissinger & Snyder (1992), Belton (1984), Brooks, Barnes *et al.* (1993), Brooks, Clay *et al.* (1995), Canevari *et al.* (1991), Chebez (1985, 1994), Collar (1996), Collar & Andrew (1988), Collar, Crosby & Stattersfield (1994), Collar, Gonzaga *et al.* (1992), Decoteau (1983), Diefenbach & Goldammer (1986b), Hayes (1995), King (1978/79), Low (1972, 1991c, 1991d, 1991e, 1991h), Lowen *et al.* (1996), Nores & Yzurieta (1994), de la Peña (1988), Ridgely (1981), do Rosário (1996), Scherer-Neto (1991), Sick (1985, 1993), Sick & Teixeira (1979), Silva, F. (1981), Silva, T. (1991c), Stoodley & Stoodley (1990), Stotz *et al.* (1996), Varty *et al.* (1994a, 1994b), Wege & Long (1995), Whitney (1996).

311. Red-crowned Amazon

Amazona viridigenalis

French: Amazone à joues vertes **German:** Grünwangenamazone **Spanish:** Amazona Tamapulepa
Other common names: Red-crowned Parrot, Green-cheeked Amazon/Parrot

Taxonomy. *Chrysotis viridigenalis* Cassin, 1853, South America; error = north-eastern Mexico. Monotypic.

Distribution. NE Mexico; records from S Texas, USA, possibly refer to wandering wild birds displaced by food shortages in Tamaulipas rather than to escaped cage-birds. Introduced or feral populations in various cities in USA, with small ones in Puerto Rico and Oahu (Hawaiian Is).

Descriptive notes. 33 cm; 294 g. Lores and forehead to mid-crown red, bare orbital ring white, cheeks and ear-coverts bright green, with bluish grey extending from above eye down sides of neck; hindcrown and nape green edged blackish, giving scaled effect; upper- and underparts green, with red speculum, dark blue primaries and broad yellowish tips on outer rectrices. Female and immature have reduced red on head.

Habitat. Tropical evergreen gallery forest in arid lowlands, deciduous woodland on slopes and in canyons, partially cleared areas with groves, and dry open pine-oak stands on ridges up to 1200 m.

Food and Feeding. Nuts, berries, buds, flowers and fruit are taken according to season, with pine seeds important for some populations; acorns, *Pithecellobium* beans, and berries of *Ehretia anagua* and the exotic *Melia azedarach* are specifically recorded. Feral birds adapt to urban parkland food sources such as *Juglans*, *Liquidambar*, *Eucalyptus* and *Chorisa*.



Status and Conservation. ENDANGERED. CITES II. A BirdLife "restricted-range" species. Massively reduced in numbers by high trapping pressure and extensive destruction of habitat. From late 1960's through to early 1980's, when Mexico imposed a ban on exports, the species was traded annually in thousands and in some years, when allowing for smuggling, possibly tens of thousands. Current population judged to be 3000-6500 birds, with no sign of adequate protection from either source of threat. The only substantial protected area in which it occurs is El Cielo Biosphere Reserve, where its status is unknown.

Bibliography. Anon. (1997d), Beissinger & Snyder (1992), Clinton-Eitnienar (1986, 1988, 1989, 1996), Collar (1996), Collar & Andrew (1988), Collar, Crosby & Stattersfield (1994), Collar, Gonzaga *et al.* (1992), Decoteau (1983), Enkerlin-Hoeflich (1995), Enkerlin-Hoeflich & Hogan (1997), Enkerlin-Hoeflich *et al.* (1993), Froke (1981), Gehlbach (1987), Gehlbach *et al.* (1976), Gildardo (1976), Howell & Webb (1995a), Inskipp & Corrigan (1992), Inskipp *et al.* (1988), Iñigo-Elias & Ramos (1991), Lantermann (1982), Lever (1987), Low (1972), Lowery & Dalquest (1951), Martin *et al.* (1954), Neck (1986), Owre (1973), Pérez & Eguarte (1989), Raffaele (1989), Ridgely (1981), Snyder *et al.* (1987), Spilsbury (1981), Stoodley & Stoodley (1990), Stotz *et al.* (1996), Wege & Long (1995), Whitney (1996), Wozniak & Lantermann (1984), Zimmerman (1957).

312. Lilac-crowned Amazon

Amazona finschi

French: Amazone à couronne lilas **German:** Blaukappenamazone **Spanish:** Amazona Guayabera
Other common names: Lilac-crowned Parrot

Taxonomy. *Chrysotis finschi* P. L. Slater, 1864, Mexico. Forms superspecies with *A. autumnalis*. Proposed northern race *woodi* very poorly differentiated. Monotypic.

Distribution. NW to SW Mexico. Feral population in Los Angeles, USA.



Descriptive notes. 31-34 cm; 282-312 g. Generally green, paler on underparts, where narrow dark feather edging gives light scaled effect, and yellowish on face; lores and forecrown dull red; mid-crown to hindcrown and sides of neck lilac, mixing green and edged dark on nape; carpal area yellowish; speculum red, primaries mostly dark blue, secondaries blue-tipped; tail with yellow tips to outer feathers. Immature similar.

Habitat. Semi-deciduous woodland and edge, dry and humid pine-oak forest in foothills and mountains up to 2200 m, occasionally down to sea-level, where enters mangroves.

Food and Feeding. No specific information on wild food; flocks damage corn and ripening bananas.

Breeding. Mar-May. Nest in hole in tree. Eggs undescribed in wild, possibly only 2; in captivity, incubation 28-29 days, nestling period 60 days.

Movements. Occurrence in flocks outside breeding season suggests some wandering; presence in lowlands believed to be chiefly or only in winter.

Status and Conservation. Not globally threatened. CITES II. Currently considered near-threatened. Frequent to common within restricted range, very uncommon in Oaxaca. With commercial export of birds banned in Sept 1982, only tiny numbers have been recorded in trade; local trade is also outlawed. However, it was once and may continue to be a crop pest, and suffer persecution consequently.

Bibliography. Anon. (1993), Binford (1989), Blake & Hanson (1942), Clinton-Eitnienar (1996), Decoteau (1983), Howell & Webb (1995a), Inskipp *et al.* (1988), Lever (1987), Lint (1952), Low (1972), Mann & Mann (1978), Ridgely (1981), van Rossem (1945), Schaldach (1963), Snyder *et al.* (1987), Stager (1954), Stoodley & Stoodley (1990), Stotz *et al.* (1996), Whitney (1996).

313. Red-lored Amazon

Amazona autumnalis

French: Amazone diadème **German:** Rotstirnamazone **Spanish:** Amazona Frentirroja
Other common names: Red-lored Parrot

Taxonomy. *Psittacus autumnalis* Linnaeus, 1758, West Indies; error = southern Mexico. Forms superspecies with *A. finschi*. Races *salvini* (incorporating *lilacina*) and *diadema* may both be incipient species. Four subspecies recognized.

Subspecies and Distribution.

A. a. autumnalis (Linnaeus, 1758) - Caribbean seaboard and slope from E Mexico to N Nicaragua.

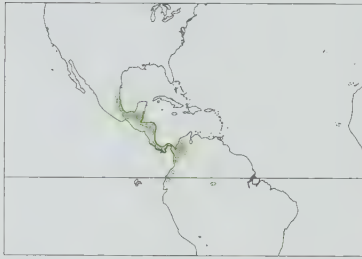
A. a. salvini (Salvadori, 1891) - N Nicaragua S to SW Colombia and NW Venezuela.

A. a. lilacina Lesson, 1844 - W Ecuador.

A. a. diadema (Spix, 1824) - lower R Negro and adjacent N bank of Amazon, NW Brazil.

Descriptive notes. 32-35 cm; 314-485 g. Similar to *A. finschi* but replaces deep red of lores and forehead with brighter red, lilac of crown with light mauve-blue, and yellowish green cheeks with yellow. Immature has less red on head, and yellow cheeks flecked green. Race *salvini* has duller yellowish green cheeks, duller but more extensive blue on hindcrown and nape, and basal red in outer tail; *lilacina* similar with red superciliary and yellower cheeks; *diadema* like *salvini* with dark red lores, lilac from mid-crown, greener on nape.

Habitat. Edges of humid evergreen to semi-deciduous lowland and foothill forest, gallery woodland and semi-open areas with scattered trees, plantations and groves, less common in continuous blocks of forest; in Ecuador also enters dry scrubby forest. Ranges up to 1100 m, but usually much lower.



Food and Feeding. Fruits of palms, *Cordia lutea*, *Spondias purpurea*, and *Minquartia*, arillate seeds of *Stemmadenia donnell-smithii*, *Virola*, *Casearia* and *Protium*, figs, ripening legume seeds, leaf buds and some cultivated fruit including mangoes, citrus and even coffee beans.

Breeding. Feb-May in Central America; Dec-Feb in Colombia; Jan-Mar in Ecuador. Nest in hole in tall, usually dead tree, often a palm stub but also e.g. *Ceiba* or *Tabebuia*. Eggs 3-4; incubation in captivity 25-26 days.

Movements. Nothing recorded; year-round resident in NE Mexico.

Status and Conservation. Not globally threatened. CITES II. Relatively common everywhere except NE Mexico, W Venezuela and Ecuador, and in many parts of Central America the commonest amazon and sometimes one of the most numerous psittacids. Decline in NE Mexico and W Venezuela owing to high rates of trapping and extensive habitat loss. Race *lilacina* threatened owing to widespread habitat loss (although persists in disturbed fragments) and trapping presumably for domestic consumption (since both *lilacina* and *diadema* are rare in aviculture); around 400-600 birds are thought to survive. Honduras was chief source of internationally traded birds, 1981-1985, with 13,712 exported in that period.

Bibliography. Binford (1989), Birt (1996), Clinton-Eitner (1984b), Coates-Estrada *et al.* (1993), Decoteau (1983), Desenne & Strahl (1991, 1994), Enkerlin-Hoeflich (1995), González-García (1993), Haase (1986), Harrison & Holyoak (1970), Hilty & Brown (1986), Howell & Webb (1995a), Inskipp *et al.* (1988), Kunz & Abs (1996), Land (1970), Lever (1987), Low (1972, 1987d), Lowery & Dalquest (1951), Meyer de Schauensee & Phelps (1978), Monroe (1968), Pérez & Eguarte (1989), Pilgrim (1997), Ridgely (1981), Ridgely & Gwynne (1989), Russell (1964), Sick (1985, 1993), Slud (1964), Spilbury (1981), Stiles & Skutch (1989), Stoodley & Stoodley (1990), Stotz *et al.* (1996), Strunden *et al.* (1987), Wetmore (1968), Whitney (1996), Willis (1977), Willis & Eisenmann (1979).

314. Blue-cheeked Amazon

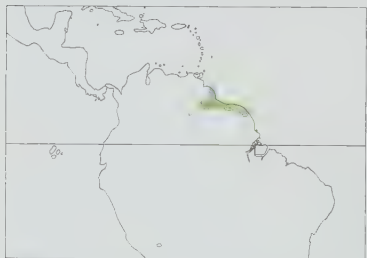
Amazona dufresniana

French: Amazone de Dufresne **German:** Goldmaskenamazone **Spanish:** Amazona Cariazul
Other common names: Blue-cheeked Parrot

Taxonomy. *Psittacus dufresnianus* Shaw, 1812, Cayenne.

Possibly forms a superspecies with *A. rhodocorytha* and *A. brasiliensis*; has been treated as conspecific with former, or even both. Monotypic.

Distribution. SE Venezuela, the Guianas and possibly adjacent Brazil.



Descriptive notes. 34 cm; 481-615 g. Forehead and lores orange-yellow; crown yellowish with broad dull green edges to feathers, giving somewhat mottled look; cheeks and ear-coverts royal blue; upperparts dull green, with dark scaling effect on back, underparts slightly paler, yellower on vent and undertail-coverts; carpal edge yellowish green, bright yellow speculum, primaries blackish; tail green with yellowish outer tips. Immature undescribed.

Habitat. Interior tropical zone forests up to 550 m in the Guianas, visiting coastal sand-ridge forests fairly briefly and irregularly (cool season); subtropical forest at 1100-1700 m in

tepui region in W of range, and probably everywhere with a preference for slightly cooler areas.

Food and Feeding. When visiting coastal areas, said to eat seeds of *Hura crepitans* and probably mimosa and other berries. No further information.

Breeding. Mar in Guyana. In captivity: 3 eggs; incubation period 23-26 days. No further information available.

Movements. Poorly understood migration occurs in at least part of the population in the Guianas, with varying numbers of birds visiting coastal sand-ridge forests Jun-Aug depending on year and apparently in response to food availability.

Status and Conservation. Not globally threatened. CITES II. Currently considered near-threatened. Generally uncommon and at low densities; apparently rarer than in last century, for reasons unknown. Threatened nationally in Venezuela by deforestation. Traded very little, perhaps most frequently for food and as pets in the far E of its range. Recorded from Roraima National Park (Venezuela) and Brownsberg Nature Park (Surinam).

Bibliography. Beissinger & Snyder (1992), Collar (1995), Decoteau (1983), Desenne & Strahl (1991, 1994), Haverschmidt & Mees (1994), Low (1972, 1996a), McLoughlin & Burton (1970), Meyer de Schauensee & Phelps (1978), Olier (1994, 1995), Ridgely (1981), Snyder (1966), Stoodley & Stoodley (1990), Stotz *et al.* (1996), Tostain *et al.* (1992), Wege & Collar (1991), Wheatley (1994), Whitney (1996).

315. Red-browed Amazon

Amazona rhodocorytha

French: Amazone à sourcils rouges **German:** Rotscheitelamazone **Spanish:** Amazona Coronirroja
Other common names: Red-crowned/Red-topped/Red-fronted Amazon/Parrot, Red-browed Parrot

Taxonomy. *Chrysotis rhodocorytha* Salvadori, 1890, Brazil.

Possibly forms a superspecies with *A. dufresniana* and *A. brasiliensis*; has been treated as conspecific with former, or even both. Monotypic.

Distribution. E Brazil in Alagoas and from Bahia S to Rio de Janeiro and São Paulo.

Descriptive notes. 35 cm. Orange red lores and crown shading to brownish purple on hindcrown, with rest of area round bill yellowish pink; cheeks bluish to violet-blue, greener on ear-coverts; nape, mantle and sides of neck green edged dark; remaining body and wings green, paler below, with small red speculum and black primaries, secondaries tipped dark blue; outer tail feathers with red subterminal patch fringed yellowish. Immature with red much reduced on head, wings and tail.

Habitat. Humid lowland forest, though also ranging into interior highlands to 900 m.



Food and Feeding. No species-specific information beyond fruit of "cajuíra" (presumably cashew nuts).

Breeding. Evidence suggests Sept-Nov, as is usual in Atlantic forest birds. In captivity: 4 eggs; incubation 24 days; nestling period 34 days.

Movements. Some displacement to mangroves noted, around Jun, in nineteenth century.

Status and Conservation. **ENDANGERED.** CITES I. Small populations highly fragmented by chronic deforestation within range, and gene exchange between many or all of them may no longer be possible. Meanwhile, birds

are still trapped for local trade. Species is present but not secure in Monte Pascoal National Park (Bahia), Rio Doce and Ibitipoca State Parks (Minas Gerais), Córrego Grande, Córrego do Veadó, Sooretama and Augusto Ruschi Biological Reserves (Espírito Santo), near Desengano State Park (Rio de Janeiro) and Serra da Bocaina National Park (São Paulo).

Bibliography. Beissinger & Snyder (1992), Camargo (1962), Collar (1996), Collar & Andrew (1988), Collar, Crosby & Stattersfield (1994), Collar, Gonzaga *et al.* (1992), Decoteau (1983), Forrester (1993), Gonzaga *et al.* (1987), Low (1972, 1987c, 1996c), Mann & Mann (1982), Pinto (1935, 1964), Pinto & Camargo (1961), Reillo (1993), Ridgely (1981), Robiller & Trogisch (1984c), Sick (1969, 1972, 1985, 1993), Stoodley & Stoodley (1990), Stotz *et al.* (1996), Sweeney (1997f), Tobias *et al.* (1993), Wege & Long (1995), Whitney (1996).

316. Red-tailed Amazon

Amazona brasiliensis

French: Amazone à joues bleues **German:** Rotschwanzamazone **Spanish:** Amazona Colirroja
Other common names: Red-tailed/Blue-cheeked Parrot

Taxonomy. *Psittacus brasiliensis* Linnaeus, 1758, Brazil.

Possibly forms a superspecies with *A. rhodocorytha* and *A. dufresniana*; has been treated as conspecific with both. Monotypic.

Distribution. SE Brazil in São Paulo and Paraná.



Descriptive notes. 37 cm. Forehead and lores rose-red shading to pink on mid-crown; rest of face pale mauve with soft blue flecking around eye; upper- and underparts green, paler below; carpal area red; wing-coverts broadly edged yellow; flight-feathers tipped dark blue; tail centrally green, broadly tipped yellow, and with broad red subterminal band basally edged dark blue on lateral feathers. Immature undescribed.

Habitat. Breeds and roosts in littoral forests of three types, seasonally and permanently flooded forest and sand-plain forest, dispersing by day to forage in these habitats; also in-

land in lowland humid "Atlantic" rain forest; and in mangroves (where also roosts).

Food and Feeding. Main food plants are *Syagrus romanzoffianum* (fruits, Feb-Apr), *Psidium cattleianum* (fruits, Oct-Dec) and *Calophyllum brasiliense* (fruits, Nov-Dec), but 68 food plants identified to date; seeds, flowers and nectar also taken, and occasionally invertebrates, e.g. beetle larvae within palm exudate, and small spiders and pupae in old seed capsules.

Breeding. Sept-Nov, but some pairs, possibly reneating, with nestlings as late as Apr. Nest in hole 1-15 m up in usually dead tree in flooded forest, mainly *Syagrus* and *Calophyllum*; sometimes in arboreal termitarium or petioles of bromeliad. Density of nests can be high, with 7 nests/ha in sand-plain forest, 18 nests/ha in seasonally flooded forest and 39 nests/ha in permanently flooded forest, this relating to density of dead trees. Eggs 3-4; incubation lasts 27-28 days; fledging probably at around 55 days.

Movements. Some minor wandering in winter (May-Aug) takes birds onto lower slopes of inland hills, but generally not above 200 m.

Status and Conservation. **ENDANGERED.** CITES I. A BirdLife "restricted-range" species. Massive pressure from trappers serving the domestic market who are responsible for almost total annual breeding failure in some populations: thus in 1991-1992 season 356 nestlings were stolen in only 25% of the species' range. "Sport" hunting has also vandalized populations. Construction of holiday homes at the coast, combined with growth in agriculture and ranching, is causing the rapid loss of most remaining lowland forest, and in the early 1990's total available habitat only covered 3057 km²; the selective removal of hardwoods and palms for many purposes is reducing feeding and breeding areas. The total number of birds in São Paulo state, 1993, was 1550, divided up into 16 distinct subpopulations; a figure of 2101 birds for Paraná state, late 1980's, was possibly an overestimate and is likely in any case to be much lower now. The species is present inside several protected areas, but poaching persists in many of them; several new areas have recently been proposed.

Bibliography. Beissinger & Snyder (1992), Bertagnolio (1981, 1983), Camargo (1962), Collar (1996), Collar & Andrew (1988), Collar, Crosby & Stattersfield (1994), Collar, Gonzaga *et al.* (1992), Curzon (1995, 1996), Decoteau (1983), Diefenbach & Goldhammer (1986a), Forrester (1993), Guix (1995), King (1978/79), Low (1972, 1987c), Lúcker (1996), Martuscelli (1994b, 1995a, 1995b, 1995c), Neto (1988), Ridgely (1981), do Rosário (1996), Scherer-Neto (1988, 1989), Scherer-Neto & Martuscelli (1992), Sick (1969, 1985, 1993), Sick & Teixeira (1979), Stoodley & Stoodley (1990), Stotz *et al.* (1996), Straube (1990), Waugh (1994, 1996b), Wege & Long (1995), Whitney (1996).

317. Festive Amazon

Amazona festiva

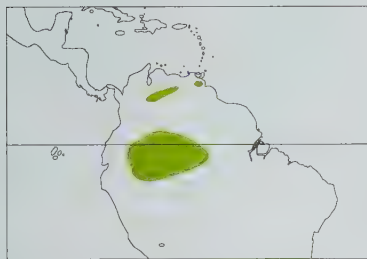
French: Amazone tavoua **German:** Blaubartamazone **Spanish:** Amazona Festiva
Other common names: Festive Parrot

Taxonomy. *Psittacus festivus* Linnaeus, 1758, Indies; error, Brazilian Amazon River.

Two subspecies recognized.

Subspecies and Distribution.

A. f. bodini (Finsch, 1873) - E Colombia E through Orinoco basin of Venezuela, sporadically into NW Guyana.



A. f. festiva (Linnaeus, 1758) - SE Colombia, E Ecuador and E Peru E through Amazon basin to W Pará, NC Brazil.

Descriptive notes. 34 cm. General plumage green; lores and frontal band dark red, with pale blue shading above and behind eye, and on chin; slight effect of "scaling" on nape; lower back and rump red; carpal edge yellowish; primaries dark blue; tail tipped yellowish. Immature has less blue on head, and green lower back and rump. Race *bodini* more yellowish below, lores grey-black, forecrown red, face with bluish green tinge.

Habitat. Closely associated with humid low-

land vegetation (to 500 m) along major watercourses: seasonally flooded *várzea* and permanently

flooded *igapó* forest, river islands, riparian growth, gallery forest, seasonally wet savannas. Avoids dryland forest.

Food and Feeding. No information available.

Breeding. Incubation reported as 26-27 days. No further information available.

Movements. Regular or irregular movements may occur, taking the species beyond the normal limits of its range, hence into E Ecuador, Guyana and the Amazon delta, but many apparently extralimital reports need confirmation.

Status and Conservation. Not globally threatened. CITES II. Generally common and stable within restricted but largely intact habitat probably throughout range; locally abundant in upper Amazon. However, in Venezuela suffering from combination of habitat loss and trapping for trade. Rare in trade at least internationally.

Bibliography. Decoteau (1983), Desenne & Strahl (1991, 1994), Hilty & Brown (1986), Low (1972), Meyer de Schauensee & Phelps (1978), O'Neill (1981), Parker *et al.* (1982), Pinto (1964), Pulido (1991), Ridgely (1981), Romero (1978), Sick (1985, 1993), Snyder (1966), Stoodley & Stoodley (1990), Stotz *et al.* (1996), VanDerHeyden (1992), Wheatley (1994), Whitney (1996).



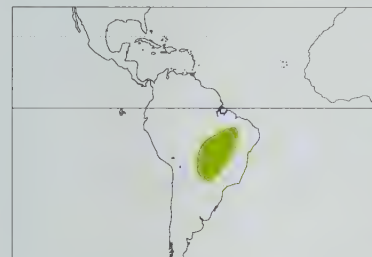
318. Yellow-faced Amazon

Amazona xanthops

French: Amazone à face jaune **German:** Goldbauchamazone **Spanish:** Amazona del Cerrado
Other common names: (Brazilian) Yellow-faced Parrot

Taxonomy. *Psittacus xanthops* Spix, 1824, interior of Minas Gerais. Placement within genus *Amazona* has been questioned. Monotypic.

Distribution. Interior Brazil from Maranhão S to N Paraguay and E Bolivia.



Descriptive notes. 27 cm. Head and neck yellow with green feathering on nape and upper breast; lower breast and belly orange red, with some yellow; belly yellow; thighs and vent grass green; upperparts green with yellow margins to many feathers; tail green, outer feathers yellowish and basally marked red. Immature has reduced yellow on head, rest green; underparts barred yellowish and green. More information needed on age- and sex-related plumage differences.

Habitat. Occurs in wooded grassland (*cerrado*), spiny arid scrub (*caatinga*), gallery forest, and *Mauritia* palm stands.

Food and Feeding. Fruits and seeds, notably legumes and Anacardiaceae; very fond of mangoes, frequenting fruiting trees for weeks.

Breeding. Nest in holes in large *cerrado* trees; incubation 23-24 days.

Movements. Birds disappear from Distrito Federal (Brasília), Apr-Aug. Also shows semi-nomadic movements, ranging over huge areas.

Status and Conservation. **VULNERABLE.** CITES II. The destruction of *cerrado* has been extensive, with 60-70% converted to agriculture in past 20 years; semi-nomadism of the species suggests it depends on unpredictable food resources and cannot be conserved with certainty by the network of reserves within its range.

Bibliography. Antas & Cavalcanti (1988), Cavalcanti (1988), Collar (1996), Collar & Andrew (1988), Collar *et al.* (1994), Decoteau (1983), Low (1972), Olrog (1968), Pinto (1964), Remsen & T aylor (1989), Remsen *et al.* (1986), Ridgely (1981), Robiller *et al.* (1988b), Sick (1985, 1993), Stoodley & Stoodley (1990), Stotz *et al.* (1996), Wheatley (1994), Whitney (1996), Willis (1992).

319. Yellow-shouldered Amazon

Amazona barbadensis

French: Amazone à épaulettes jaunes **Spanish:** Amazona Hombrogualda
German: Gelbflügelamazone
Other common names: Yellow-shouldered Parrot

Taxonomy. *Psittacus barbadensis* J. F. Gmelin, 1788, Barbados; error = Venezuela.

Sometimes placed in genus *Chrysotis*. Proposed race *rothschildi* for Caribbean islands invalid. Monotypic.

Distribution. N Venezuela and islands of Margarita and La Blanquilla; also Bonaire (Netherlands Antilles).



Descriptive notes. 33 cm. Green with narrow dark edges to feathers giving light scaled effect, bluish tinge on underparts; forehead white shading to yellow on mid-crown and around eye, with light blue suffusion on lower cheeks and chin; shoulder and thighs yellow; speculum red, flight-feathers tipped dark blue. Immature lacks bluish tinge below.

Habitat. Xerophytic vegetation such as dry cactus scrubland and thornbush in lowland areas where annual rainfall is less than 1000 mm, but tracts of denser woodland may be important.

Food and Feeding. Fruits, seeds and/or flowers of *Platymiscum*, *Pithecellobium*, *Piptadenia*, *Piscidia*, *Bulnesia*, *Tabeaia*, *Capparis*, *Malpighia*, *Bourreria*, *Casearia*, *Guaiacum*, *Terminalia*, *Spondias*, *Moringa*, *Ziziphus*, *Caesalpinia*, *Crotalaria*, *Acacia*, *Prosopis*, *Leucaena*, *Bursera*, *Crescentia* and various cacti.

Breeding. Mar-May generally, but probably variable with weather conditions. Nest in hole in tree, cactus or cliff. Eggs 2-5; incubation 22-27 days; nestling period 53-61 days.

Movements. None certainly documented, but non-breeding wandering in search of food likely; occasional movements between La Blanquilla and Margarita have been postulated.

Status and Conservation. **VULNERABLE.** CITES I. A BirdLife "restricted-range" species. Heavily exploited everywhere for largely internal pet trade, compounded by tourist developments on the islands and other forms of habitat destruction, e.g. mining; other problems include some persecution as a crop pest and occasional island droughts. Population on mainland unknown, but a roost of 700 recorded in 1989. Margarita held 650-800 in late 1980's, rising under management to 914 in 1992. Blanquilla held under 80 in 1992. Over 400 were counted on Bonaire, 1987, this population gaining some protection within Washington-Slagbaai National Park.

Bibliography. Albornoz *et al.* (1994), Anon. (1995g), Arndt (1989), Beissinger & Snyder (1992), Collar (1996), Collar & Andrew (1988), Collar, Crosby & Stattersfield (1994), Collar, Gonzaga *et al.* (1992), Decoteau (1983), Desenne & Strahl (1991, 1994), Eddy (1995), Harrison & Holyoak (1970), van Helmond & Wijzman (1988), Jordens (1985), Low (1972, 1981, 1983a, 1994b), Mellink & Molina (1984), Meyer de Schauensee & Phelps (1978), Noegel (1983, 1986), Rebolledo (1994), Reijns & van der Salm (1981), Ridgely (1981), Rodríguez & Rojas-Suárez (1994), Rojas-Suárez (1991, 1994b, 1994c), Rooth (1968), Silvius (1989, 1991a, 1991b), Spaans (1973), Stoodley & Stoodley (1990), Stotz *et al.* (1996), Vierheilig & Vierheilig (1988), Voous (1983, 1985), Wege & Long (1995), Whitney (1996).

320. Blue-fronted Amazon

Amazona aestiva

French: Amazone à front bleu **German:** Rotbugamazone **Spanish:** Amazona Frentiazul
Other common names: Turquoise-fronted Amazon/Parrot, Blue-fronted Parrot; Yellow-winged Amazon (*xanthopteryx*)

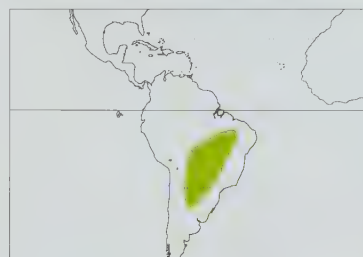
Taxonomy. *Psittacus aestivus* Linnaeus, 1758, southern Brazil.

Race *xanthopteryx* has occasionally been considered a separate species. Two subspecies recognized.

Subspecies and Distribution.

A. a. aestiva (Linnaeus, 1758) - E Brazil from Maranhão and Pará S to Rio Grande do Sul.

A. a. xanthopteryx (Berlepsch, 1896) - Bolivia and SW Brazil S through Paraguay to N Argentina.



Descriptive notes. 37 cm; mean 400 g. Fore-crown blue; mid-crown, face, chin and throat yellow, blue or green; hindcrown, posterior ear-coverts, sides of neck, nape and mantle green heavily edged blackish, producing scaled effect, less pronounced on wings and undersides; shoulder and speculum red, primaries tipped dark blue; tail green tipped yellowish, with lateral feathers basally barred with red. Immature has blue and yellow of head reduced. Race *xanthopteryx* has yellow shoulder, often variably intermixed with red of shoulder.

Habitat. *Cerrado* and Chaco scrub, savanna, palm groves, gallery forest, subtropical wood-

land; closely tied to old-growth areas with large trees providing nest-cavities. In winter, Argentina, occupies yungas forest, particularly stands of *Anadenanthera macrocarpa*.

Food and Feeding. Fruit or seeds of a wide variety of plants, notably (in Argentina) fruits of *Melia*, *Aspidosperma*, *Prosopis*, *Schinopsis* and *Ziziphus*, and seeds of *Citrus*, *Anadenanthera*, *Bulnesia* and *Cercidium*; also cactus fruit and palm seeds. Flowers of *Erythrina* and *Morus*, late Aug, immature fruits of *Cedrela*, Sept-Nov.

Breeding. Oct-Mar. Nest in hole in tree generally around 9 m up or, more rarely, cliff face or arboreal termitarium; preferred trees in Argentina include *Schinopsis*, *Aspidosperma*, *Chlorisia* and *Calycophyllum*. Normally 3 eggs (1-5); incubation (in captivity by female only) lasting 23-25 days; nestling period 58-60 days.

Movements. In Argentina, great majority of Chaco-nesting population moves W to eastern foothills of Andes, from mid-Mar to mid-Sept; some birds appear to wander E to E Paraguay. May-Jul.

Status and Conservation. Not globally threatened. CITES II. One of the most abundant of S. American amazons, benefiting from agriculture and despoiling maize and sunflower crops, and causing some damage to fruit (especially citrus) crops during winter. Very heavily trapped for cagebird trade, but impact on populations not clear; minimum net exports rose from 10,644 in 1981 to 58,464 in 1988, thereafter declining, most of these birds coming from Argentina, which exported 244,774 in the period 1985-1990. Selective cutting of mature *Schinopsis* trees, overgrazing by domestic livestock and oil exploration activities are all affecting parts of the Chaco in Argentina, but very substantial tracts of habitat remain.

Bibliography. Antas & Cavalcanti (1988), Balabusic *et al.* (1992), Boosey (1939), Bucher & Martella (1988), Bucher *et al.* (1992), Canevari *et al.* (1991), Contreras *et al.* (1990), Darrieu (1983a), Decoteau (1983), Eiseutraut (1935), Guix (1995), Hall & Fryer (1994), Hayes (1995), Inskipp & Corrigan (1992), Inskipp *et al.* (1988), Lantermann (1993), Low (1972), Mosa *et al.* (1992), Nores & Yzurieta (1994), Núñez *et al.* (1991), Olmos (1993), Orfila (1938), de la Peña (1988), Pereira (1995), Pinto (1946), Remsen & T aylor (1989), Ridgely (1981), do Rosário (1996), Samuelson (1994), Saud, Garrido & Mosa (1991), Saud, Núñez, Garrido, Cálzon & Chorolque (1991), Saud, Núñez, Garrido, Mosa *et al.* (1991), Schmutz & Prus (1987), Short (1975), Sick (1985, 1993), Smith (1942), Steinbacher (1962), Stoodley & Stoodley (1990), Stotz *et al.* (1996), Wetmore (1926), Whitney (1996).

321. Yellow-crowned Amazon

Amazona ochrocephala

French: Amazone à front jaune **German:** Gelbscheitelamazone **Spanish:** Amazona Real
Other common names: Yellow-fronted Amazon/Parrot, Yellow-crowned Parrot; Yellow-headed Amazon (*oratrix* group); Yellow-naped Amazon (*auropalliata* group)

Taxonomy. *Psittacus ochrocephalus* J. F. Gmelin, 1788, Venezuela.

Polytypic and, in Central America, apparently polymorphic. Often broken down into three species: *A. oratrix*, incorporating *tresmariae* and *belizensis*; *A. auropalliata*, incorporating *caribaea* and *parvipes*; and *A. ochrocephala* incorporating *panamensis*, *xantholaema* and *nattereri*. However, considerable variation and overlap in characters exist in populations in and adjacent to Honduras, such that no very coherent species limits can be set at any point between *oratrix* to the N and *panamensis* to the S; possibly the clearest-cut step would involve separating *oratrix* and *tresmariae*, thus transferring *belizensis* to the *ochrocephala* group. On present knowledge, entire complex is probably best regarded as a single species. Patterns of variation remain unclear and birds of extreme E Guatemala may be separable as race *guatemalensis* and those of NW Honduras as *hondurensis*; both of these forms appear closer to *oratrix* group than to *auropalliata* group. Ten subspecies currently recognized.

Subspecies and Distribution.

A. o. tresmariae Nelson, 1900 - Tres Marias Is. off WC Mexico.

A. o. oratrix Ridgway, 1887 - Pacific and Atlantic lowlands of Mexico.

A. o. belizensis Monroe & Howell, 1966 - Belize.

A. o. caribaea Lousada, 1989 - Bay Is, Honduras.

A. o. parvipes Monroe & Howell, 1966 - NE Honduras and N Nicaragua.

A. o. auropalliata (Lesson, 1842) - S Mexico S to NW Costa Rica.

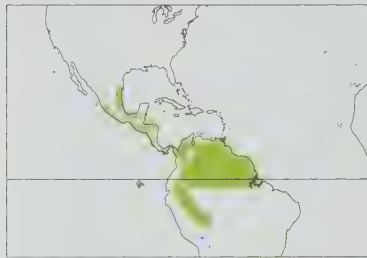
A. o. panamensis (Cabanis, 1874) - W Panama to NW Colombia.

A. o. ochrocephala (J. F. Gmelin, 1788) - E Colombia E through Venezuela, Trinidad and the Guianas to NC Brazil (Pará).

On following pages: 322. Orange-winged Amazon (*Amazona amazonica*); 323. Scaly-naped Amazon (*Amazona mercenaria*); 324. White-faced Amazon (*Amazona kawalli*); 325. Mealy Amazon (*Amazona farinosa*); 326. Vinaceous Amazon (*Amazona vinacea*); 327. St Lucia Amazon (*Amazona versicolor*); 328. Red-necked Amazon (*Amazona arausiaca*); 329. St Vincent Amazon (*Amazona guildingii*); 330. Imperial Amazon (*Amazona imperialis*); 331. Red-fan Parrot (*Deroptyus accipitrinus*); 332. Blue-bellied Parrot (*Triclaria malachitacea*).

A. o. xantholaema Berlepsch, 1913 - Marajó I, Amazon Delta, N Brazil.

A. o. nattereri (Finsch, 1865) - S Colombia S through E Ecuador and E Peru to N Bolivia and W Brazil. Feral populations (*oratrix*) in California, Florida and Puerto Rico.



Descriptive notes. 35-38 cm; 340-535 g. Green, more yellowish below; forehead and mid-crown yellow, often with some yellow round eye; cheeks and ear-coverts bright green; hindcrown to mantle green very lightly edged blackish; bend of wing red, carpal edge yellowish, speculum red, flight-feathers tipped dark blue; tail tipped yellow and basally marked red on outer feathers. Immature duller, with less yellow and red on head and wing. In N populations, adult plumage appears to develop more yellow with age. Subspecies show small but usually distinctive variations in distribution of yellow on head, culminating in N

with entirely yellow-headed races *oratrix* and *tresmariae*.

Habitat. Tropical deciduous woodland, tall thorn scrub, humid gallery forest, seasonally flooded (*várzea*) forest and secondary riverine growth, mangroves, pine savanna, *Mauritia* palm stands in wetter open areas, llanos, cultivated land with remnant groves and woodlots, and even some suburban areas, always in lowlands.

Food and Feeding. Fruit and/or seeds and flowers of trees such as *Pithecellobium* (whose beans are a winter staple in NE Mexico), *Acacia*, *Macuna*, *Zuelania*, *Bumelia*, *Solanum*, *Tabebuia*, *Erythrina*, *Ficus*, *Cochlospermum*, *Curatella*, *Terminalia* and *Euterpe* and other palms. Flocks also take cultivated crops such as maize, green bananas, mangoes, lemons, avocados and lucerne (this last implying feeding on ground).

Breeding. Feb-May in Mexico and NE Venezuela; Dec-Jan in Colombia; Jan in Surinam. Nest in hollow in tree, often in dead wood including palm stub, generally 4-15 m up but sometimes lower; also in terrarium. Eggs 2-3; incubation 25-26 days.

Movements. Year-round resident in Mexico, and this probably true throughout range; however, some birds appear to wander in response to local food shortages, and occasional flocks of considerable size form.

Status and Conservation. Not globally threatened. CITES II. The distinctive yellow-headed populations of *oratrix* in Mexico and, more recently, of *belizensis* in Belize are, however, very seriously threatened by combination of habitat loss and intensive trapping (this bird being a renowned "talker" as well as most attractive). The populations of proposed races *guatemalensis* and *hondurensis* are both highly threatened (despite the latter's presence inside Punta Sal National Park) and number in the low hundreds, and race *caribaea* likewise probably 100-200. Honduran population of *parvipes* estimated at c. 140,000 birds. Locally quite common in Panama and local in Colombia. Venezuelan population in steep decline owing to conversion of llanos and intensive trapping. However, the species remains extremely common in other parts of its range, e.g. SE Peru (present in Manu National Park, where density reaches 0.5 pairs/km²) and NC Brazil (Roraima). Rare on Trinidad.

Bibliography. Anon. (1993), Arman & Arman (1980, 1981), Binford (1989), Bosch (1991b), Chapman *et al.* (1989), Clinton-Eitnir (1990, 1996), Collar (1996), Collar, Crosby & Stattersfield (1994), Collar, Gonzaga *et al.* (1992), Decoteau (1983), Desenne (1994), Desenne & Strahl (1991, 1994), Dolton (1994), Enkerlin-Hoflich (1995), Freud (1980b, 1991b), Gildardo (1976), González (1995a, 1995b), Hansen (1984), Haverschmidt & Mees (1994), Hilty & Brown (1986), Howell & Webb (1995a), Inskipp & Corriga (1992), Inskipp *et al.* (1988), Lever (1987), Lousada (1989), Lousada & Howell (1996), Low (1972), Lowery & Dalquest (1951), McLoughlin & Burton (1970), Meyer de Schauensee & Phelps (1978), Monroe (1968), Monroe & Howell (1966), O'Neill (1981), Parkes (1990a), Pérez & Eguarte (1989), Pfeffer (1988b), Pulido (1991), Ridgely (1981), Ridgely & Gwynne (1989), Samuelson (1994), Schaldach (1963), Scheid (1992), Schindlinger (1996), Sick (1985, 1993), Silva (1993a), Slud (1964), Smith (1970), Snyder (1966), Stiles & Skutch (1989), Stoodley, J. & Stoodley (1990), Stoodley, P. & Stoodley (1983), Stotz *et al.* (1996), Terborgh, Fitzpatrick & Emmons (1984), Terborgh, Robinson *et al.* (1990), Thurber *et al.* (1987), Toft & Brice (1993), Tostain *et al.* (1992), Wege & Long (1995), Wetmore (1939, 1968), Whitney (1996), Wiedenfeld (1993).

322. Orange-winged Amazon

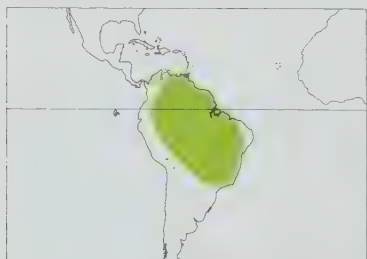
Amazona amazonica

French: Amazone aourou **German:** Venezuelaamazone **Spanish:** Amazona Alinaranja
Other common names: Orange-winged Parrot

Taxonomy. *Psittacus amazonicus* Linnaeus, 1766, Surinam; error = "le pays des Amazones".

Validity of proposed race *tobagensis* of Trinidad and Tobago highly dubious, as differences probably attributable to individual variation. Monotypic.

Distribution. N & E Colombia, E Ecuador, E Peru and N Bolivia E through Venezuela, Trinidad and Tobago, the Guianas and the Amazon basin to N & E Brazil.



Descriptive notes. 31 cm; 298-469 g. Yellow forehead and area from base of bill to below eye, separated by blue stripe from lores over and behind eye; rest of head blue-green shading to green on rest of body; carpal edge yellow; orange-red speculum; tail green tipped yellowish, lateral feathers tinged orange-red with a central dark green bar, outermost edged blue. Immature similar to adult.

Habitat. Lowlands, rarely above 600 m, occurring in virtually every habitat in its range where tall trees are present except humid *terra firme* forest (where *A. farinosa* the dominant amazon); thus in *várzea* and second growth

along rivers, gallery forest, rain forest margins and clearings, mangroves, deciduous woodland, savanna and more open areas with *Mauritia* palm groves, parklands and even gardens; large numbers seen roosting in giant bamboo.

Food and Feeding. Little studied, with only a few plant species identified, such as *Erythrina*, *Sloanea*, *Richeria*, *Byrsionima*, *Curatella americana*, *Tabebuia serratifolia*, palms *Euterpe*, hog plum *Spondias mombin*, but propensity for cultivated crops (oranges, mangoes, cocoa) suggests adaptability to many local food sources.

Breeding. Jan-Jun on Trinidad; Mar-Jun in NE Venezuela; Feb-Mar in Surinam; Dec-Feb in Colombia. Nest in hole in tree, including mangroves in Surinam, cabbage palm stumps in Trinidad. Eggs 2-5; incubation, by female only, lasting around 3 weeks; nestling period around 2 months.

Movements. None is recorded.

Status and Conservation. Not globally threatened. CITES II. Abundant throughout much of extensive range, in many places, notably in N of range, the commonest large parrot, and classified as a pest on Trinidad and Tobago. Deforestation has caused some declines in E Brazil, and "sport" hunting has reduced numbers in Surinam; hunting in French Guiana is excessive. Very heavily trapped in parts of range, with Guyana the source of the great majority of birds in international trade (66,615 in years 1981-1985), but with probably high levels of domestic consumption also, e.g. in Venezuela.

Bibliography. Decoteau (1983), Desenne & Strahl (1991, 1994), French (1991), Freud (1993a), Friedmann (1948b), Hadgkiss & Mitchell (1983a), Haverschmidt & Mees (1994), Hilty & Brown (1986), Inskipp *et al.* (1988), Lever (1987), Low (1972), McLoughlin & Burton (1970), Meyer de Schauensee & Phelps (1978), Millam *et al.* (1995), Niles (1981), Nottebohm & Nottebohm (1969), O'Neill (1981), Ott (1982), Parker *et al.* (1982), Pinto (1946, 1964), Ridgely (1981), da Rocha *et al.* (1988), Schubart *et al.* (1965), Sick (1985, 1993), Snyder (1966), Stoodley & Stoodley (1990), Stotz *et al.* (1996), Tostain *et al.* (1992), Whitney (1996), Williams (1992).

323. Scaly-naped Amazon

Amazona mercenaria

French: Amazone mercenaire **German:** Soldatenamazone **Spanish:** Amazona Mercenaria
Other common names: Scaly-naped Parrot

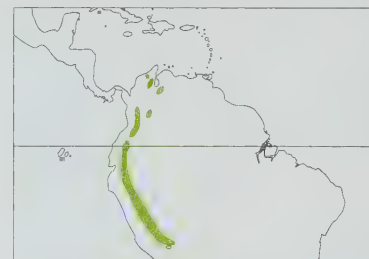
Taxonomy. *Psittacus mercenarius* Tschudi, 1844, Peru.

Two subspecies recognized.

Subspecies and Distribution.

A. m. canipalliata (Cabanis, 1874) - Andes of Venezuela, Colombia and Ecuador.

A. m. mercenaria (Tschudi, 1844) - Andes of Peru and Bolivia; one record from Argentina.



Descriptive notes. 33-34 cm; 340 g. Mainly green, darker above, hindcrown, nape and mantle with dark edges to feathers giving slight scaled effect; small whitish bare orbital ring; tail-coverts yellowish green; carpal edge yellowish with some orange-red; speculum red; flight-feathers tipped dark blue; tail green tipped yellowish, lateral feathers with broad red subterminal bar. Immatures undescribed. Race *canipalliata* lacks red speculum.

Habitat. Subtropical and temperate cloud forest and other montane formations, often in broken, part-open country with ravines, ridgetops and clearings. Generally 1500-3000 m, but as

low as 800 m in E Andes of Peru and Bolivia, and up to treeline at 3600 m in Colombia.

Food and Feeding. Apparently no information.

Breeding. Mar-May in Colombia. Nest and eggs undescribed. Incubation 25-26 days.

Movements. Some seasonal elevational movement or semi-nomadism noted in W Andes of Colombia; probably true throughout range, as suggested by formation of large roosts in non-breeding season, Bolivia, and by observations of birds flying very high at one site in SW Ecuador.

Status and Conservation. Not globally threatened. CITES II. Generally a low-density species and nowhere common; has suffered from deforestation in N of range, notably in Colombia, although still common on Santa Marta massif and resident in Cueva de los Guácharos National Park; highly threatened by habitat loss within restricted range, Venezuela. Little traded owing to confinement to montane forest and low densities.

Bibliography. Bond & Meyer de Schauensee (1943), Butler (1979), Carriker (1959), Darlington (1931), Decoteau (1983), Desenne & Strahl (1991, 1994), Fjeldså & Krabbe (1990), Hilty & Brown (1986), Low (1972), Meyer de Schauensee & Phelps (1978), Nore & Yzurieta (1994), O'Neill (1981), Remsen & T aylor (1989), Ridgely (1981), Ridgely & Gaulin (1980), Stoodley & Stoodley (1990), Stotz *et al.* (1996), Todd & Carriker (1922), Walker & Jacobs (1995), Whitney (1996).

324. White-faced Amazon

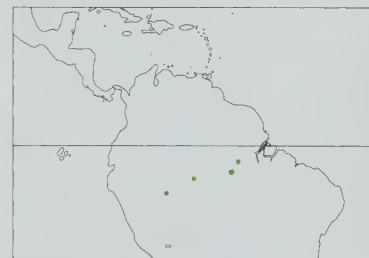
Amazona kawalli

French: Amazone de Kawall **German:** Kawallamazone **Spanish:** Amazona de Kawall
Other common names: Kawall's Parrot

Taxonomy. *Amazona kawalli* Grantsau and Camargo, 1989, Mato Piri, right bank of Rio Juruá below Eirunepé, Amazonas, Brazil.

Taxonomic status of this recently described form was questioned, and it was widely considered to be an aberrant form of *A. farinosa*, but scrutiny of further evidence has convincingly shown it to be a valid species. Monotypic.

Distribution. Amazon basin, Brazil.



Descriptive notes. 35-36 cm. Very close to *A. farinosa* but with narrow white strip of bare skin bordering base of bill, and periorbital ring mid-grey; tail shorter with correspondingly reduced yellowish terminal band, with scarlet and some blue on basal half of outermost tail feathers; also lacks red on leading edge of wing (sympatric *A. farinosa* possess this) and the floury glaucous tone to the upperparts, except the mantle, which gives *A. farinosa* its name. Immature undescribed.

Habitat. Tropical lowland forest, possibly associated with watercourses.

Food and Feeding. No information.

Breeding. No information.

Movements. No information.

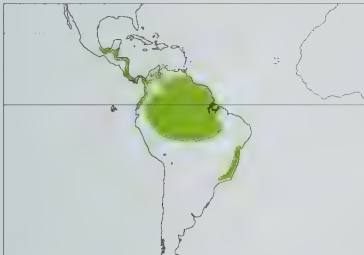
Status and Conservation. Not globally threatened. CITES II. Very recently discovered, and still known only from three wild-caught museum skins and a few captive birds, but the general evidence, particularly the wide range over which records are distributed, indicates this is an uncommon but cryptic species with no serious current threats. Captive bird found in 1996 on edge of Amazonas National Park, suggesting presence there.

Bibliography. Anon. (1991), Bosch (1991a), Collar & Pittman (1996), Decoteau (1983), Forgach (1996), Forrester (1993), Grantsau & Camargo (1989, 1990), Kawai (1997), Low (1990a), Pittman (1997a), Stotz *et al.* (1996), Stresemann (1924a), Vuilleumier *et al.* (1992), Wheatley (1994), Whitney (1996).

325. Mealy Amazon
Amazona farinosa

French: Amazone poudrée **German:** Mülleramazone **Spanish:** Amazona Harinosa
Other common names: Mealy/Blue-crowned Parrot

Taxonomy. *Psittacus farinosus* Boddaert, 1783, Cayenne.
Proposed South American races *chapmani* and *inornata* appear to lack consistent features. Three subspecies currently recognized.
Subspecies and Distribution.
A. f. guatemalae (P. L. Sclater, 1860) - SE Mexico to NW Honduras.
A. f. virenticeps (Salvadori, 1891) - Sula Valley, Honduras, to W Panama.
A. f. farinosa (Boddaert, 1783) - E Panama and E, N & W Colombia E to SC Venezuela and the Guianas, and S through NW & E Ecuador, E Peru and NE Bolivia to Amazon basin, then on to CE & SE Brazil.



Descriptive notes. 38-43 cm; 535-766 g. Generally dull green, with hindcrown, nape and upperparts suffused floury glaucous, face and underparts paler; large white bare orbital ring; forehead to mid-crown variably yellow (sometimes full, patchy or absent), hindcrown and nape edged dark, giving scaled effect; wing with red to orange carpal edge, red speculum and dark blue tips to flight-feathers; tail green with very broad yellowish green terminal band. Immature similar. Race *virenticeps* has yellowish green carpal edge and bluish green crown; *guatemalae* is similar but with much bluer crown.

Habitat. Extensive tracts of lowland tropical evergreen forest usually on dry ground, sometimes (perhaps seasonally) also in stands of *Mauritia* palms, deciduous and gallery woodland, sand-ridge forest, semi-open and tall second growth near forest; occasionally reaches to 1500 m in N & W of range, but generally below 500 m.
Food and Feeding. Seeds and/or fruit of palms *Euterpe*, figs, *Brosimum*, *Inga*, *Dussia*, *Eschweilera*, *Pithecellobium*, *Tetragastris*, *Dialium guianensis*, *Peritassa compta*, *Prionostemma aspera*, *Cochlospermum orinocense*, *Sloanea grandiflora*, *Corina macrocarpa*, *Abuta grandifolia*, *Piptadenia psilostachya*, *Cecropia miparia*, *Helicostylis tomentosa*, *Micropholis*, *Pouteria*; also buds and flowers, arils of *Casearia* and *Virola*, and nectar of *Tabebuia insignis*.
Breeding. Apr-May in Guatemala; Nov-Feb in SC Brazil. Nest in hole in tree, 3-30 m up, also once in crevice in stone wall. Eggs 3; incubation 26-27 days.
Movements. Found to increase in numbers in sand-ridge forests of coastal Surinam, Jul-Aug; wanders into mountains, NW Colombia, Oct-Jan, and is most numerous in far SE, Jun-Oct. Considered a permanent resident, Oaxaca, Mexico.
Status and Conservation. Not globally threatened. CITES II. Large populations survive in the less disturbed parts of its extensive range, but has suffered from forest destruction in Central America, W Ecuador and SE Brazil, and is heavily hunted for food in French Guiana; trade is generally moderate, heavy in some countries. Present in Manu National Park, Peru, where density reaches 2 pairs/km²; common on Cerro Pirre, Darién National Park, Panama, and in Tikal National Park, Guatemala.
Bibliography. Binford (1989), Burkhart (1985), Collar & Pittman (1996), Decoteau (1983), Desenne (1994), Desenne & Strahl (1991, 1994), Friedmann (1948b), González-García (1993), Haverschmidt & Mees (1994), Higgins (1979), Hilty & Brown (1986), Howell & Webb (1995a), Inskipp *et al.* (1988), Lantermann (1990), Low (1972), McLoughlin & Burton (1970), Meyer de Schauensee & Phelps (1978), Monroe (1968), O'Neill (1981), Paynter (1955), Ridgely (1981), Ridgely & Gwynne (1989), Sick (1985, 1993), Slud (1964), Snyder (1966), Stiles & Skutch (1989), Stoodley & Stoodley (1990), Stotz *et al.* (1996), Terborgh, Fitzpatrick & Emmons (1984), Terborgh, Robinson *et al.* (1990), Tostain *et al.* (1992), Wetmore (1957, 1968), Whitney (1996), Woodbury (1992).

326. Vinaceous Amazon
Amazona vinacea

French: Amazone vineuse **German:** Taubenhalsamazone **Spanish:** Amazona Vinosa
Other common names: Vinaceous/Vinaceous-breasted Parrot

Taxonomy. *Psittacus vinaceus* Kuhl, 1820, Brazil. Monotypic.
Distribution. E Brazil from Bahia S to E Paraguay and N Argentina.



Descriptive notes. 30 cm. Lores and frontal band red; rest of head green with dark edging on crown feathers, giving scaled effect, more pronounced on nape and sides of neck, where feathers pale blue, and breast and belly, where feathers purple; back and wings dark green, with red and yellow carpal area, red speculum and turquoise on outer webs of blue-tipped primaries; tail green with narrow yellow terminal band and basal dull red on outer feathers. Immature has reduced red lores, green in breast, yellowish carpal area.
Habitat. Associated closely with forest dominated by *Araucaria angustifolia* at least in S of range, possibly in N also, but degree of dependence unclear. Also reported present in epiphyte- and bamboo-rich humid forest, young second growth, pinewoods and woodlots in cleared areas.
Food and Feeding. *Araucaria* nuts and possibly other cone-crops much exploited, but also buds, berries, fruits, flowers and young eucalyptus and pine leaves, with *Euterpe edulis* fruits and chewing *Guadua* bamboo shoots and leaves noted; formerly caused damage to orange orchards.
Breeding. Sept-Dec in Argentina and Paraguay, rather later in Brazil, with some evidence that delayed breeding by some pairs may relate to need to use already occupied nest-sites. Nest is a hole

in a tree, mostly *Araucaria*, of which many places now lack specimens of sufficient size. Eggs 2-4; incubation 25-26 days; nestling period c. 70 days.

Movements. Unclear, but when formerly abundant considerable invasions of Paraguay occurred at times. In Rio Grande do Sul some post-breeding dispersal occurs, with many birds disappearing in Jan and all in Mar, returning in Apr and present for rest of year. Annual variations in *Araucaria* or other cone-crop production would cause dispersive, nomadic behaviour.

Status and Conservation. ENDANGERED. CITES I. Now rare virtually everywhere within its substantial range, and nowhere numerous. Common to abundant in the nineteenth century, deforestation has caused a long-term decline in the past 100 years, and clearance of large tracts of *Araucaria* (2100 km² in Misiones, Argentina, in 1960 reduced to two patches totalling 5 km² by 1988) has doubtless been most damaging. International trade has never been large, but trapping for domestic markets appears to have been heavy over many decades. Protected areas where the species occurs in some numbers, none of which seems likely to provide year-round needs, include Caratinga (Minas Gerais), Campos do Jordão and Jacupiranga State Parks (São Paulo), Lauréas State Park (Paraná), São Joaquim National Park (Santa Catarina), Espigão Alto State Park, Serra Geral and Aparados da Serra National Parks (Rio Grande do Sul), Brazil; Itabó Nature Reserve, Itabó and Limoy Biological Reserves and Tatí Yupí Biological Refuge, Paraguay; and Araucaria Provincial Park, Argentina.

Bibliography. Aleixo & Galetti (1997), Beissinger & Snyder (1992), Belton (1984), Bertagnolio (1981), Boçon (1994), Brooks *et al.* (1993), Canevari *et al.* (1991), Collar (1996), Collar & Andrew (1988), Collar, Crosby & Stattersfield (1994), Collar, Gonzaga *et al.* (1992), Decoteau (1983), Hayes (1995), López (1992), Low (1972), Lowen *et al.* (1996), Navas & Bó (1988), Nores & Yzurieta (1994), de la Peña (1988), Pinto (1938), Ridgely (1981), do Rosário (1996), Scott & Brooke (1985), Sick (1972, 1985, 1993), Sick & Teixeira (1979), Silva (1991b), Stoodley & Stoodley (1990), Stotz *et al.* (1996), Sweeney (1997d), Wege & Long (1995), Whitney (1996), Willis & Oniki (1981).

327. St Lucia Amazon
Amazona versicolor

French: Amazone de Sainte-Lucie **German:** Blaustirnamazone **Spanish:** Amazona de Santa Lucía
Other common names: St Lucia Parrot

Taxonomy. *Psittacus versicolor* P. L. S. Müller, 1776, Havana; error = St Lucia. Forms a superspecies with *A. arausiaca*. Monotypic.
Distribution. St Lucia (Lesser Antilles).



Descriptive notes. 43 cm. Royal blue forehead and lores shading paler on mid-crown and face, becoming scaled green on hindcrown, nape, sides of neck and mantle; red patch on upper breast with green and maroon mottling on lower breast and maroon on belly; vent greenish yellow; wings green with red speculum and dark blue primaries; tail green tipped yellowish. Immature undescribed.
Habitat. Tropical moist forest, now all in montane interior.
Food and Feeding. Fruits and/or seeds of *Clusia*, *Talauma*, *Pouteria*, *Miconia*, *Manilkara*, *Byrsonima*, *Sloanea*, *Pithecellobium*, *Dacryodes*,

Cassipourea, *Protium*, *Torrubia*, *Pterocarpus*, *Sterculia* and several palms.
Breeding. Feb-Mar or later. Nest in hole in tree. Eggs 2; in captivity, incubation 28 days, nestling period c. 81 days.
Movements. None reported.
Status and Conservation. VULNERABLE. CITES I. A BirdLife "restricted-range" species. Formerly common, but only 1000 birds estimated around 1950 and a steady decline thereafter as combination of habitat loss, hunting (for food), trade and hurricanes continued to reduce numbers. Major conservation endeavours from late 1970's, when possibly only 150 birds remained, resulted in strong national and popular support for species, whose numbers by 1990 were 300-350.
Bibliography. Anon. (1983, 1988), Beissinger & Snyder (1992), Bond (1985), Butler (1981, 1987, 1991, 1992), Christian, Lacher *et al.* (1996), Collar (1996), Collar & Andrew (1988), Collar, Crosby & Stattersfield (1994), Collar, Gonzaga *et al.* (1992), Copsey (1995), Decoteau (1983), Diamond (1973), Fidgett & Robert (1993), Hoppe (1997a, 1997b), Jeggo (1976a, 1976b, 1981, 1983, 1987, 1991), Jeggo & Anthony (1991), Jeggo & Taynton (1981), Jeggo, Anthony & John (1989), Jeggo, Taynton & Bobb (1983), Jovicich (1976), Keith (1997), Kepler (1973), King (1978/79), Low (1972, 1980b, 1987c, 1994b), Mühlhaus & Mühlhaus (1983), Nichols (1976, 1977), Silva (1980b), Stoodley & Stoodley (1990), Stotz *et al.* (1996), Whitney (1996), Wingate (1969).

328. Red-necked Amazon
Amazona arausiaca

French: Amazone de Bouquet **German:** Blaukopfamazone **Spanish:** Amazona Gorgirroja
Other common names: Red-necked Parrot

Taxonomy. *Psittacus arausiacus* P. L. S. Müller, 1776, Dominica. Forms a superspecies with *A. versicolor*. Monotypic.
Distribution. Dominica (Lesser Antilles).



Descriptive notes. 40 cm. Similar to *A. versicolor* but with no dark edges to feathers giving scaled effect, and with red on upper breast reduced to throat spot; speculum red and yellow; primaries tipped blue-black. Immature undescribed.
Habitat. Moist forest chiefly at 300-800 m, sometimes ranging into more open cultivated areas.
Food and Feeding. Wide range of fruits and/or seeds recorded, including *Dacryodes*, *Licania*, *Richeria*, *Amanoa*, *Simarouba*, *Symphonia*, *Cordia*, *Pithecellobium*, *Byrsonima*, *Anacardium*, *Pouteria*, *Dussia*, *Ormosia* and palms, sometimes

also wild guava and cultivated citrus.

Breeding. Feb-Jun. Nest in hole in tree, often *Dacryodes excelsa* and *Sloanea berteriana*. Eggs 2. **Movements.** Formerly descended to N coastal area, Aug-Oct, and still rather nomadic, Nov-Jan.

Status and Conservation. VULNERABLE. CITES I. A BirdLife "restricted-range" species. Conflicting reports of former abundance; by early 1970's probably less than 400, owing to habitat loss, hunting (for food) and trade. Two hurricanes, 1979 and 1980, possibly halved population. Natural recovery and considerable conservation effort since that time has resulted in 500-1000 birds currently.

Bibliography. Amberger (1989), Anon. (1983), Beissinger & Snyder (1992), Bond (1928b, 1941, 1985), Butler (1989, 1992), Christian, James & Charles (1994), Christian, Lacher *et al.* (1996), Christian, Zamore & Christian (1994), Collar (1996), Collar & Andrew (1988), Collar, Crosby & Stattersfield (1994), Collar, Gonzaga *et al.* (1992), Decoteau (1983), Evans, P.G.H. (1988, 1991, 1994), Gochfeld (1974), Gregoire (1981), Howes (1929), Kepler (1973), King (1978/79), Low (1972, 1987c, 1994b), Nichols (1976, 1977), Nichols *et al.* (1976), Snyder & Snyder (1979), Stoodley & Stoodley (1990), Stotz *et al.* (1996), Swank & Julien (1975), Whitney (1996).

329. St Vincent Amazon

Amazona guildingii

French: Amazone de Saint-Vincent

Spanish: Amazona de San Vicente

German: Königsamazone

Other common names: St Vincent Parrot

Taxonomy. *Psittacus Guildingii* Vigors, 1837. St Vincent. Monotypic.

Distribution. St Vincent (Lesser Antilles).



Descriptive notes. 40 cm. Two morphs. Commoner yellow-brown morph, itself variable, has head white shading to yellowish orange on hindcrown, cheeks and chin, with bluish patch behind eye and blue-grey "scaled" nape, shading to scaled bronze upperparts and breast, becoming greenish yellow on vent; wing-coverts orange and red, primaries black with yellow bases, secondaries deep blue with orange bases; tail deep blue with broad yellow terminal band and orange at base. Immature similar but duller. Green morph tends to lack much of orange, with dull green upperparts and whitish blue face.

Habitat. Mature moist forest, with some preference for lower elevations where larger trees and hence more nest-sites exist, occasionally wandering into cultivated areas.

Food and Feeding. Fruit and/or seeds of *Pouteria* and *Dacryodes* especially, also *Cordia*, *Krugiodendron*, *Micropholis*, *Dussia*, *Talauma*, *Inga*, *Chione*, *Simaruba*, *Ixora*, *Sloanea*, *Richeria*, *Psidium*, *Annona*, *Calophyllum*, *Andira*, *Alphanes*, *Cecropia*, *Meliosma*, various palms and figs.

Breeding. Jan-Jul, mostly Apr-May. Nest in holes in trees, chiefly *Dacryodes*, sometimes close together. Eggs 2, rarely 3; in captivity, incubation c. 24 days, nestling period 67-69 days.

Movements. None recorded.

Status and Conservation. VULNERABLE. CITES I. A BirdLife "restricted-range" species. Formerly common, but up to the early 1980's suffered from the combined effects of habitat destruction, trade, hunting (for food), hurricanes and eruptions. With increasing conservation activity thereafter, censuses have suggested a steady population increase, from 370-470 in 1982, 440-500 in 1988, to around 800 in 1994. Considerable effort has been given to habitat conservation, law enforcement and public awareness in past 15 years, so that both the amazon and its habitat are currently relatively secure. There is a 44 km² St Vincent Parrot Reserve in the centre of the island.

Bibliography. Allen (1961), Andrie & Andrie (1975), Anon. (1983), Beissinger & Snyder (1992), Berry (1974, 1981), Bond (1985), Butler (1988, 1990, 1992), Christian (1993), Christian, Lacher *et al.* (1996), Collar (1996), Collar & Andrew (1988), Collar, Crosby & Stattersfield (1994), Collar, Gonzaga *et al.* (1992), Decoteau (1983), DeFreitas (1990), Forshaw (1997), Gochfeld (1974), Greenwood (1994), Harrison & Holyoak (1970), Jeggo (1981, 1991), Kepler (1973), King (1978/79), Laidler (1977), Lambert (1983, 1985), Low (1972, 1987c, 1994b), Nichols, H.A.J. (1974, 1975, 1976), Nichols, H.A.J. & Nichols (1973), Nichols, T.D. (1981b), Noegel *et al.* (1991), Robiller & Trogisch (1985b), Silva (1989b), Snyder *et al.* (1987), Stoodley & Stoodley (1990), Stotz *et al.* (1996), Whitney (1996).

330. Imperial Amazon

Amazona imperialis

French: Amazone impériale

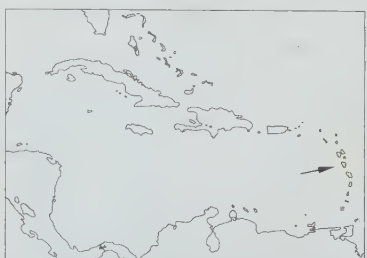
German: Kaiseramazone

Spanish: Amazona Imperial

Other common names: Imperial Parrot

Taxonomy. *Amazona imperialis* Richmond, 1899, Dominica. Monotypic.

Distribution. Dominica (Lesser Antilles).



Descriptive notes. 45 cm. Head, nape and mantle purplish black, shading to purple with dark margins giving a scaled effect on undersides; thighs and vent dull green; wings dull green with red carpals, purple speculum and blackish blue primaries; tail reddish brown tipped greenish blue. Immature has green nape and neck.

Habitat. Moist forest chiefly at 600-1300 m.

Food and Feeding. Wide range of fruits and/or seeds recorded, including *Dacryodes*, *Licania*, *Richeria*, *Amanoa*, *Simarouba*, *Symphonia*, *Pouteria*, *Tapura*, *Clusia* and several palms.

Breeding. Feb-Jun. Nest in hole in tree, notably *Dacryodes excelsa* and *Sloanea berteriana*. Eggs 2, though seldom more than 1 young reared.

Movements. Sedentary.

Status and Conservation. VULNERABLE. CITES I. A BirdLife "restricted-range" species. Formerly common to abundant within relatively small, inaccessible range, declining catastrophically

in the period 1880-1980 owing to habitat destruction, extensive hunting for food, trade and hurricanes, two of the latter in 1979 and 1980 reducing the population to 40-100. Natural recovery and considerable conservation effort since that time has resulted in some upturn, with 80-100 in 1993 and higher numbers judged present in 1994.

Bibliography. Amberger (1989), Anon. (1983), Beissinger & Snyder (1992), Bond (1928b, 1941, 1985), Butler (1989, 1992), Christian, James & Charles (1994), Christian, Lacher *et al.* (1996), Christian, Zamore & Christian (1994), Collar (1996), Collar & Andrew (1988), Collar, Crosby & Stattersfield (1994), Collar, Gonzaga *et al.* (1992), Decoteau (1983), Evans, P.G.H. (1988, 1991, 1994), Gochfeld (1974), Gregoire (1981), Harrison & Holyoak (1970), Kepler (1973), King (1978/79), Low (1972, 1987c, 1994b), Nichols, H.A.J. (1976, 1977), Nichols, H.A.J. *et al.* (1976), Nichols, T.D. (1981c, 1986), Snyder & Snyder (1979), Stoodley & Stoodley (1990), Stotz *et al.* (1996), Swank & Julien (1975), Whitney (1996), Wood (1924a).

Genus *DEROPTYUS* Wagler, 1832

331. Red-fan Parrot

Deroptyus accipitrinus

French: Papegai maillé

German: Fächerpapagei

Spanish: Loro Cacique

Other common names: Hawk-headed Parrot

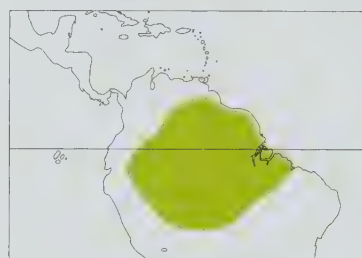
Taxonomy. *Psittacus accipitrinus* Linnaeus, 1758, India; error = Cayenne.

Races may be better regarded as constituting a parapatric species pair. Two subspecies currently recognized.

Subspecies and Distribution.

D. a. accipitrinus (Linnaeus, 1758) - SE Colombia, E Ecuador and NE Peru to Venezuela, the Guianas and Brazil N of Amazon (to Amapá).

D. a. fuscifrons Hellmayr, 1905 - Brazil S of Amazon from upper R Madeira, Rondônia and N Mato Grosso E to Maranhão; possibly also N Bolivia.



Descriptive notes. 35-36 cm; 190-300 g. Forehead and crown above eye white; face, cheeks and throat brown with buff shaft streaks, also some feathers backing mid-crown; hindcrown, elongated nape feathers, sides of neck, breast and belly maroon edged light blue; back, wings, thighs and undertail-coverts dull green; primaries and underside of tail blackish; upper tail green edged blue, with concealed maroon spot at base of inner web. Immature has less white on forehead. Race *fuscifrons* has forehead and crown dusky brown with whitish shaft streaks, no maroon spot on tail.

Habitat. Undisturbed *terra firme* forest, sometimes apparently avoiding *várzea*, edge and clearings; however, also recorded in coastal sand-ridge and savanna forests, although in Venezuela mostly feeding in riverine habitats.

Food and Feeding. Small understorey fruits, hard fruits of various palms such as *Attalea*, *Astrocaryum*, *Euterpe* and *Jessenia*, flowers, petioles of leaves, buds and shoots of *Bombacopsis*, leaves of *Spondias mombin*, seeds of *Jacaranda copeia*, *Caraipa densiflora*, *Licaria alba*, pulp and seeds of *Tetragastris*, fruit of *Ocotea globifera* and *Dialium guianense* and also cultivated guava (*Psidium*) and *Inga* fruit.

Breeding. Dec and Feb in Brazil; Jan-Apr in the Guianas; Feb-Jun in Venezuela, but with courtship and copulation witnessed in Aug. Nest in holes in trees, also stumps. In captivity: 2-3 eggs; incubation 28 days; nestling period 9 weeks. In the wild, the only two nests whose contents were determined held a chick each.

Movements. Some local displacements may occur as abundance fluctuates seasonally in certain areas.

Status and Conservation. Not globally threatened. CITES II. Nominate *accipitrinus* common in NE of range, less so in W, and known by a single record in Ecuador; little threatened by habitat loss, though in E under pressure, and in W possibly overtrapped locally; present in several large national parks and reserves. Race *fuscifrons* has perhaps suffered more from habitat loss and occurs in no protected area, but common on Rio Jiparaná in Rondônia.

Bibliography. Anon. (1993), Decoteau (1983), Descortils (1983), Desenne (1994), Desenne & Strahl (1991, 1994), Forrester (1993), Haverschmidt & Mees (1994), Hilty & Brown (1986), Howard (1972), Inskipp *et al.* (1988), Joseph (1988a), Lehmann (1957), Low (1972, 1997f), McLoughlin & Burton (1976), Meyer de Schauensee & Phelps (1978), O'Neill (1981), Oniki & Willis (1982), Penard (1927), Ridgely (1981), Santos (1991), Schubart *et al.* (1965), Sick (1985, 1993), Snyder (1966), Stotz *et al.* (1996), Strahl *et al.* (1991), Thiollay (1991), Tostain *et al.* (1992), Whitney (1996).

Genus *TRICLARIA* Wagler, 1832

332. Blue-bellied Parrot

Triclaria malachitacea

French: Crick à ventre bleu

German: Blaubauchpapagei

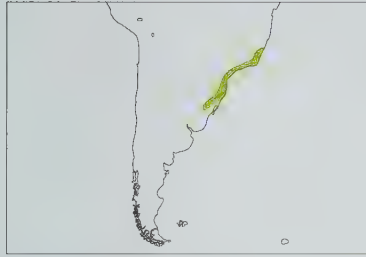
Spanish: Loro Ventriazul

Other common names: Purple-bellied Parrot

Taxonomy. *Psittacus malachitaceus* Spix, 1824, Rio de Janeiro. Monotypic.

Distribution. SE Brazil from Bahia to Rio Grande do Sul; two records from Misiones, Argentina.

Descriptive notes. 28 cm; 110-155 g. Green throughout, except for deep blue patch from lower breast to abdomen, bluish green in flight and tail feathers, and whitish bill and periocular region. Female lacks blue on belly. Immature like female, though male shows some blue on belly.



Habitat. Lower montane and escarpment humid broadleaf Atlantic forest, 300-1000 m, usually being found in the canopy of tall, bromeliad-rich forest along watercourses in valleys, but entering lowland forest and sometimes plantations, orchards and even suburban woodlands.

Food and Feeding. In Rio Grande do Sul, seeds and pulp of many native plants, notably from Euphorbiaceae, such as *Pachystroma longifolium*, *Actinostemon concolor* and *Sebastiania brasiliensis*, and, in the understorey, Myrtaceae, mainly *Eugenia rostrifolia* and *Campomanesia xanthocarpa*,

plus cultivated maize. Elsewhere fruits, including epiphytic cacti, seeds of *Psidium*, araucaria nuts, flowers of *Aechmea ornata*, nectar, buds and perhaps insects, birds also venturing into orchards to take oranges and jabuticaba fruit or seeds. Captive birds also seen to take bark, leaves, algae growing on wood. Reported penchant for fruits of the palm *Euterpe edulis* now known to be untrue.

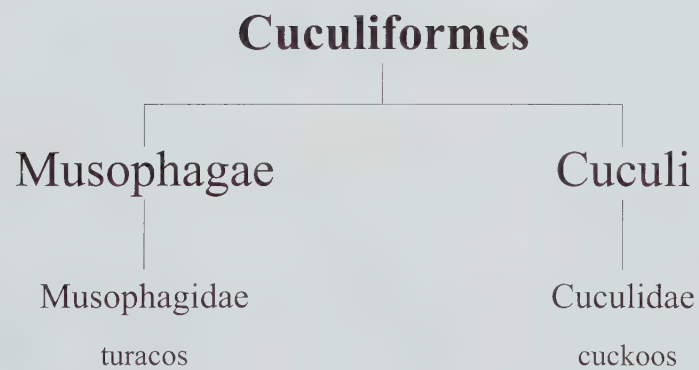
Breeding. Aug-Feb. Nest in natural hollow in old large tree, often a palm trunk, often relatively low down (3-5 m in three cases); birds strongly territorial, and nests may be as much as 2 km apart. In captivity: 2-4 eggs; incubation timed at 28 days; nestling period unknown, but dependence on parents continuing for 3 weeks after fledging.

Movements. Downslope displacements reported to occur in winter, but now known to be a year-round resident. Birds are able to disperse among habitat patches using narrow forest corridors such as strips of second-growth woodland.

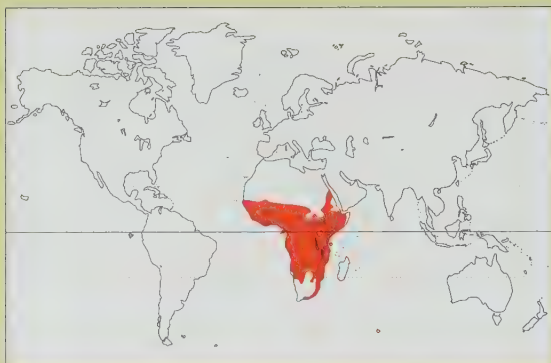
Status and Conservation. ENDANGERED. CITES II. A BirdLife "restricted-range" species. Generally uncommon, apparently being both patchily distributed and at low densities within patches; however, also highly unobtrusive unless distinctive voice known, so status hard to establish. Judged rare in Paraná, but with a maximum of 10,000 individuals in CE Rio Grande do Sul. Suffering from general habitat clearance in many areas, plus hunting for food (notably in winter when in more populated areas), compounded by a moderate amount of trade. In Brazil recorded from Sooretama, Augusto Ruschi and Duas Bocas Biological Reserves (Espírito Santo), Desengano State Park and Serra do Tinguá Biological Reserve (Rio de Janeiro), Serra da Bocaina National Park, Boracéia Biological Station, Intervalles State Park, and Carlos Botelho, Alto Ribeira, Juréia, Jacupiranga and Ilha do Cardoso State Parks (São Paulo), and Aparados da Serra National Park (Rio Grande do Sul); in Argentina, has been recorded in Iguazú National Park and Uruguá-i Natural Reserve. Main strongholds are Intervalles and Botelho, plus the escarpment forests of Rio Grande do Sul, where protected areas, sustainable forest management programmes and education initiatives are urgently needed.

Bibliography. Aleixo & Galetti (1997), Beissinger & Snyder (1992), Belton (1984), Bencke (1996), Bertagnolio (1981), Camargo (1976), Canevari *et al.* (1991), Collar (1996), Collar & Andrew (1988), Collar, Crosby & Stattersfield (1994), Collar, Gonzaga *et al.* (1992), Descourtilz (1983), Forrester (1993), Galetti (1996), Guix (1995), Guix *et al.* (1992), Low (1972, 1988b), Murray (1969), Pinto (1938, 1946), Pizo *et al.* (1995), Ridgely (1981), do Rosário (1996), Rumboll (1990), Sick (1968, 1985, 1993), Sick & Teixeira (1979), Stotz *et al.* (1996), Straube & Scherer-Neto (1995), Wege & Long (1995), Whitney (1996).

Order CUCULIFORMES



Class AVES
Order CUCULIFORMES
Suborder MUSOPHAGAE
Family MUSOPHAGIDAE (TURACOS)



- Medium-sized to large, fairly stocky arboreal birds with a rather long tail and short, rounded wings; head often with prominent crest and strikingly coloured; plumage largely glossy.
- 40-75 cm.



- Sub-Saharan Africa.
- Forest, woodland and savanna.
- 6 genera, 23 species, 38 taxa.
- 2 species threatened; none extinct since 1600.

Systematics

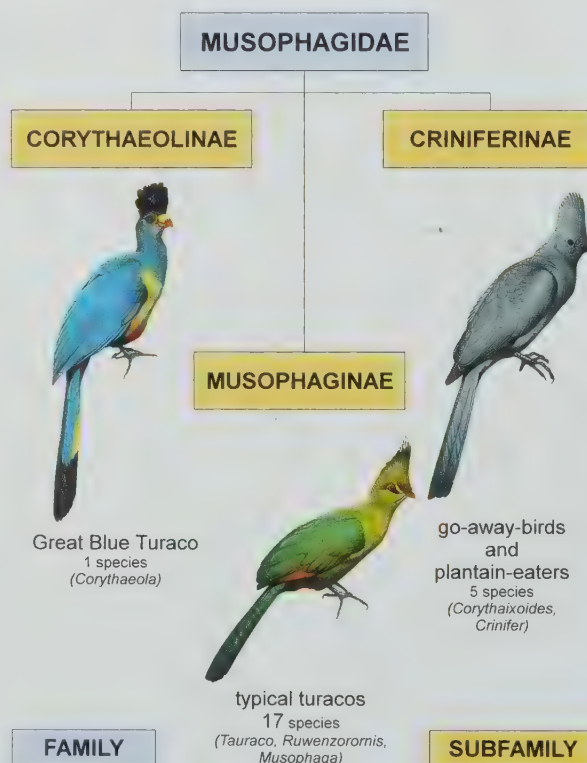
Turacos, or louries as they are commonly referred to in southern Africa, are a truly remarkable group of birds now endemic to sub-Saharan Africa. Despite a number of extraordinary features which they exhibit, their evolutionary background remains largely unknown. There are fossil records from the Oligocene of Egypt and Bavaria, and also from the Miocene of France.

While the turacos have normally been placed within the order Cuculiformes, there is increasing evidence that they are not allied with cuckoos but belong in a separate order, the Musophagiformes. Early systematists, including Linnaeus, were clearly influenced by certain superficial resemblances to the cuckoos, and concluded that the two groups were phylogenetically allied. This traditional association of turacos with cuckoos has always been based largely on the fact that the two share the zygodactyl arrangement of the toes, with two toes pointing forward and two pointing back. Other anatomical characters, however, principally feather-tracts, osteology and myology, do not support the relationship.

In his 1886 monograph of the turacos, H. Schalow reviewed the classifications of earlier authors. While noting that several groups had been proposed as their allies, including gamebirds (Galliformes), pigeons (Columbidae), woodpeckers (Picidae), trogons (Trogonidae), parrots (Psittacidae), mousebirds (Coliidae) and rollers (Coraciidae), he felt that the turacos were in fact related to the mousebirds. Later, E. Mayr and D. Amadon reflected the uncertainty about the relationships of cuckoos and turacos by noting the many differences of opinion: first, as to whether or not turacos should be associated with the gamebirds; and, second, whether or not the cuckoos were related to them. They felt it best to place turacos tentatively near the gamebirds; at the same time, however, they considered that it was entirely possible that the Musophagidae were somewhat primitive relatives of the Cuculidae, and so they tentatively followed convention in associating the two families in the same order. R. Verheyen, on the other hand, firmly believed that turacos were indeed related to the galliforms, whereas C. G. Sibley found that the electrophoretic patterns of the egg-white proteins of turacos were totally unlike those of galliforms. In fact, the egg-white evidence allowed Sibley to conclude that turacos and cuckoos were related and should be placed in the same order. However, recent DNA-DNA hybridization evidence presented by Sibley and J. E. Ahlquist suggests that the turacos are not particularly closely related to the cuck-

oos. The turaco lineage may have diverged from the cuckoo lineage in the Cretaceous period, of the order of 100 million years ago.

Within Musophagidae itself, the systematics are complex. Several differing opinions have been offered, and over the last century the family has been subdivided into anything from two to four subfamilies, with four to nine genera and 18-23 species. Three subfamilies are commonly accepted, Corythaerinae, Musophaginae (or Tauracinae) and Criniferinae. While this arrangement has generally been followed, there are exceptions: Verheyen included both Musophaginae and Tauracinae, to make four; and, quite recently, Sibley and Ahlquist admitted only two subfamilies, Musophaginae and Criniferinae. It should be noted



*Subdivision of the
Musophaqidae.*

[Figure: Ian Lewington]

Relationships within the turaco family are not always so clear-cut as they might appear. Some authorities have suggested that the Ruwenzori Turaco and also the Purple-crested Turaco (*Tauraco porphyreolophus*) should be placed in the genus *Musophaga*, although both are perhaps intermediate between that genus and *Tauraco*. Bearing in mind the distinctive bill shape and structure of the Ruwenzori Turaco, as well as its unique territorial call, it seems more apt to place this species in its own monotypic genus, *Ruwenzorornis*.

[*Ruwenzorornis johnstoni johnstoni*, Virunga National Park, north-east Zaire. Photo: Bruce Davidson/Animals Animals]



that Musophaginae is sometimes listed as Tauracinae, but although the latter name has priority, dating from Rafinesque's 1815 name as opposed to Lesson's 1820 one, *Musophaga* is retained as the basis for both the subfamily and family names, on the grounds that it has almost universally been used as the basis of the family name for over 150 years.

Corythaeolinae contains only the monotypic *Corythaeola* of rain forest, clearly an isolated genus which would appear to be without any close relatives.

Musophaginae includes the genera *Tauraco*, *Ruwenzorornis* and *Musophaga*, within which the species composition is controversial. While there are some seventeen forms to consider, those grouped within the *T. persa* superspecies have formed the main subject of discussion. This complex of allopatric forms has in the past been treated as either a single polytypic species, or as three, five or six species. It may be best to treat them as six species with ranges that approach each other very closely, but without any known area of intergradation, suggesting that these forms are reproductively isolated from one another. Indeed, wherever the ranges of these allopatric forms approach each other, the change from one to the other is quite abrupt, and in some cases they are separated by as little as 20-40 km. Recent analyses of vocalizations and chromosome-banding patterns also suggest that this complex of green turacos is one of genetically isolated species and is best treated as comprising six allospecies.

The genus *Musophaga* has traditionally been made up of Ross's Turaco (*Musophaga rossae*) and the Violet Turaco (*Musophaga violacea*). More recently, however, there has been a proposal to enlarge it to embrace four parapatric species in two superspecies. While the Purple-crested Turaco (*Tauraco porphyreolophus*) and the Ruwenzori Turaco (*Ruwenzorornis johnstoni*) may be considered systematically intermediate between *Tauraco* and *Musophaga* by some authors, others prefer to retain the Purple-crested within the genus *Tauraco*, but to place the Ruwenzori Turaco in the monotypic *Ruwenzorornis* on account of its distinctive bill shape and structure and its unique call.

The five dry-country species of the subfamily Criniferinae are traditionally placed in two genera, *Corythaixoides* and *Crinifer*, although it has been suggested that the White-bellied Go-away-bird (*Corythaixoides leucogaster*) is biologically and

geographically intermediate between *Corythaixoides* and *Crinifer*, and should therefore be placed in a monotypic genus, *Criniferoides*. While it shares several of the characters exhibited by the Bare-faced Go-away-bird (*Corythaixoides personatus*) and the Grey Go-away-bird (*Corythaixoides concolor*), it lacks green pigment and certainly appears to be less closely related to them than they are to one another.

Thus, the present treatment recognizes 23 species of turaco in six genera: *Corythaeola* is monotypic; *Tauraco* contains 14 species; *Ruwenzorornis* is again monotypic; *Musophaga* has two species; *Corythaixoides* has three; and *Crinifer* has two. These are grouped in the three subfamilies mentioned above. In attempting to understand relationships between the species, the major difficulties have always been whether the Musophagidae derive originally from stock dwelling in evergreen forest and whether the possession of turacin and/or turacoverdin is a primitive character or not. A point on which there is little disagreement is that the *Musophaga* species must be particularly close to, and derived from, the *Tauraco* species, and that the Grey and Bare-faced Go-away-birds are probably dry-country derivatives of the same forest stock. The Great Blue Turaco (*Corythaeola cristata*) and the two plantain-eaters (*Crinifer*) are, however, difficult to place in the overall evolution of the family. The Great Blue resembles *Tauraco* species in its green pigment, but differs in virtually all other characters. The Eastern Grey Plantain-eater (*Crinifer zonurus*) shares a similar tail pattern with the Great Blue, but little else. Perhaps the most acceptable suggestion is that the Great Blue Turaco, unique in its combination of the pigment uroporphyrin and its tail pattern, is nearest to the ancestral stock. It may also be speculated that the plantain-eaters are independently descended from an earlier line of savanna-adapted turacos, which branched off from the main forest-inhabiting line of turacos before the go-away-birds. The plantain-eaters lost uroporphyrin, and developed, or possibly retained, a type of head feathering now unrepresented elsewhere in the family. Recent DNA-DNA hybridization data indicate that *Crinifer* and *Tauraco* diverged about 50 million years ago, after which the main line of development would have proceeded to the evolution of turacin as well as turacoverdin in the *Tauraco* species, with *Musophaga* diverging later from this branch through the development of a frontal shield and massive deposits of melanin.

Notwithstanding these uncertainties, the turacos remain a family of considerable evolutionary interest, with an unusually high proportion of species belonging to superspecies, and with several species showing quite substantial subspecific morphological differences. Our ignorance of the geological history of Africa is such, however, that it is impossible to produce any detailed hypothesis of the course of turaco evolution on either the ecological or the morphological side. The time involved may well be great, several tens of millions of years, and one can do no more than vaguely envisage the isolation of one population after another. In-depth analytical studies of turaco behaviour, ecology and biochemistry are all needed before we can hope for a better understanding of the relationships of this remarkable family.

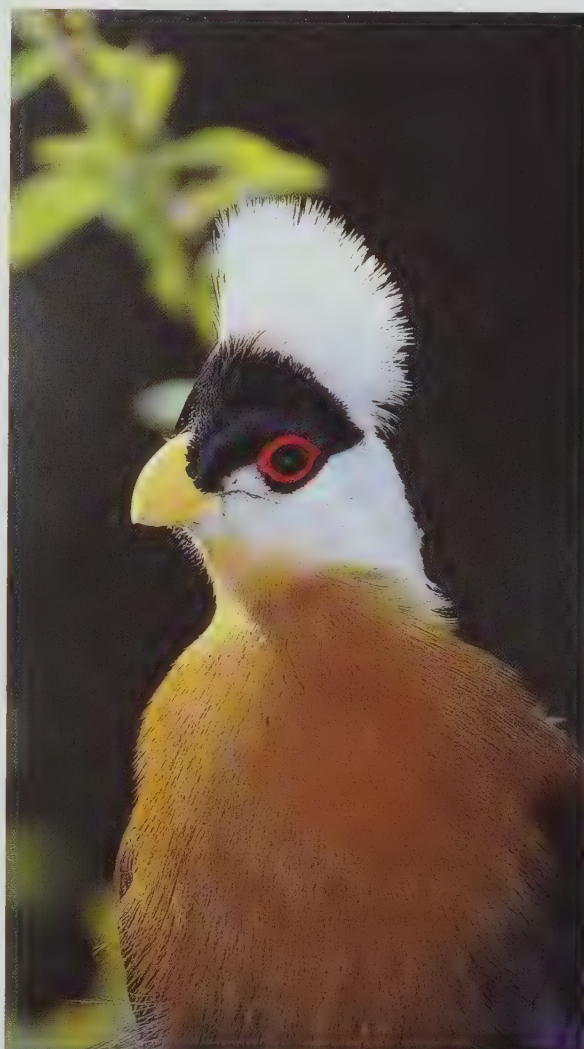
Morphological Aspects

Apart from the giant of the family, the Great Blue Turaco, all turacos are medium-sized birds with a rather long tail and short rounded wings. In most species the feathers of the head and breast are largely lacking in barbules, giving them a "hairy" texture. Turacos are unusual among non-passerines in having at least five, instead of four, quills on the alula; in addition, the first and second of these quills are of similar proportions, rather than the second being shorter. Nearly all turaco species have a conspicuous erectile crest, the shape, size and colour of which are highly diversified in the genus *Tauraco*. The bill is strong and decurved. The sexes are generally alike, an exception being found in the White-bellied Go-away-bird, in which the male and female differ only in bill colour.

The flight of turacos is weak and laboured, but, by contrast, the semi-zygodactylous toes enable them to move easily and with

great agility along branches and through vegetation. This unique feature of the toes differs from the truly zygodactyl foot of cuckoos in that the fourth, or outer, toe of turacos can be brought back to form an angle of about 70 degrees with the first toe, or brought forward until it almost touches the third toe. Normally, however, it is held at right angles to the main axis of the foot when the bird is running, standing on a flat surface, or alighting. Such variability is in total contrast to cuckoos, which have the fourth toe permanently reversed.

A unique feature of the family is the presence of two copper pigments, red turacin and green turacoverdin, which are unknown in any other birds, or indeed anywhere else in the Animal Kingdom. Generally, such bright colours in birds are produced by melanins and lipochromes, or by diffraction of light from the feather surface, but not so with turacos. Turacoverdin occurs in several species that do not possess turacin, but turacin does not occur in the absence of turacoverdin. The amount of turacoverdin is also directly correlated with the luxuriance of the habitat, being most developed in species inhabiting lush evergreen forest, and least developed or absent in those living in deciduous woodlands and acacia thornbush. For example, the White-crested Turaco (*Tauraco leucolophus*) is the only *Tauraco* species with no turacoverdin on the head and neck, although that on the breast and mantle is of full intensity. The long-perpetuated fallacy that turacin is washed out of the birds' plumage during rainstorms must once again be refuted: the pigment is soluble only in alkali and in no other solution. Turacin does, however, have a much more limited distribution in the plumage than turacoverdin, occurring only in the wings, crest and nape, and in a small patch on the otherwise all-green breast of the Ruwenzori Turaco and the nominate race of the Purple-crested Turaco. It is a copper complex of an organic substance, uroporphyrin 111, and is present in



Although turacos are noted for their bright, glossy plumage, not all species exhibit such remarkable colours. The Grey Go-away-bird is the plainest member of the family, appearing more or less uniform grey, in keeping with its open-country habitat. In contrast, the members of the genus *Tauraco* have largely green plumage, with conspicuous bright red areas and, generally, variable patterns of black and white on the face. The green coloration is due to the presence over much of the head and body of the copper pigment turacoverdin. The White-crested Turaco is the only member of this genus lacking this pigment on the head and neck.

[Left: *Corythaixoides concolor concolor*, Kruger National Park, South Africa. Photo: Philip van den Berg/ Bruce Coleman.

Right: *Tauraco leucolophus*. Photo: Art Wolfe]

The head pattern is generally a useful feature in distinguishing similar species of turaco.

The White-cheeked Turaco of montane forests of the Ethiopian Highlands has a large white loreal patch bordered below by a black band, and a prominent but variable white patch on the side of the neck. Its bright red orbital ring is enhanced by large wattles on the upper "eyelid", a diagnostic character visible only at close range. This is one of three turaco species which, for reasons not properly understood, appear to have a reduction in melanin pigment on the back and wing-coverts.

[*Tauraco leucotis*.
Photo: Gerry Ellis/
ENP Images]



such quantities that the red plumage of a single bird may yield as much as 8 mg of copper and 25 mg of pure uroporphyrin. While turacin occurs in the wings of all *Tauraco* and *Musophaga* species, turacoverdin occurs more widely over the body, over all or part of the head, neck, mantle and breast of the *Tauraco* species. Turacoverdin never appears in the wings except in those of the Great Blue Turaco, and, while largely absent in the go-away-

birds and the plantain-eaters, it does occur on the breast of the Grey and the Bare-faced Go-away-birds. The distribution of these unique copper pigments in relation to habitat is of considerable interest (see Table).

In the *Tauraco* species, melanin is virtually confined to the belly, wings, back and tail. In the *Musophaga* species, the melanin is exceptionally dense and black throughout the entire plumage, except for the red areas on the head and wings. The giant *Corythaeola* has the belly and thighs coloured with a reddish brown melanin unlike that in any other species. A curious case is provided by the White-cheeked Turaco (*Tauraco leucotis*), Ruspoli's Turaco (*Tauraco ruspolii*) and the Purple-crested Turaco, all of which, but especially the last species, have the back and wing-coverts a greyish blue, instead of the rich glossy blue, green or violet seen in all other *Tauraco* species. Since there is no reason to suppose that the Purple-crested is in any way closely related to the other two, the character may be due to convergence, in which case the reduction of melanin in the feathers may be an adaptation to drier conditions. This is, however, pure speculation.

Gloss is also strongly developed in all turacos except the Great Blue, the go-away-birds and the plantain-eaters. The colour of the gloss on the body and tail varies remarkably in the Knysna Turaco (*Tauraco corythaix*), from green in the nominate race to blue in the race *phoebus*. There is also an unbroken cline in the Black-billed Turaco (*Tauraco schuetti*), from the violet-blue of nominate birds, through blue, to green in the race *emini*. In Livingstone's Turaco (*Tauraco livingstonii*) the situation is even more complex, with not only body gloss but also crest length varying considerably: nominate birds have the mantle, scapulars and wings dark green, with a crest length of 65-75 mm; the subspecies *cabanisi*, found in the coastal lowlands of south-east Africa from St Lucia north to Dar-es-Salaam, has the scapulars and wings dull bluish green, tinged with violet, and a crest length as in nominate birds; but inland in eastern Tanzania, the race *reichenowi* has the scapulars and wings more dark bluish and a crest length of less than 65 mm. Such changes in body gloss within a species are not obviously correlated with climatic or other factors, and it is hard to believe that they are adaptive.

On the other hand, if it is assumed that the development of turacoverdin is an ancestral feature of the Musophagidae, and if

Distribution of Turacin and Turacoverdin
in relation to habitat

	Habitat	Turacin	Turacoverdin
<i>Corythaeola cristata</i>	forest	nil	partial
<i>Tauraco persa</i>	forest	full	full
<i>Tauraco livingstonii</i>	forest	full	full
<i>Tauraco schalowi</i>	forest	full	full
<i>Tauraco corythaix</i>	forest	full	full
<i>Tauraco schuetti</i>	forest	full	full
<i>Tauraco fischeri</i>	forest	full	full
<i>Tauraco macrorhynchus</i>	forest	full	full
<i>Tauraco leucolophus</i>	gallery forest	full	partial
<i>Tauraco bannermani</i>	forest	full	full
<i>Tauraco erythrolophus</i>	gallery forest	full	full
<i>Tauraco hartlaubi</i>	forest	full	full
<i>Tauraco leucotis</i>	forest	full	full
<i>Tauraco ruspolii</i>	woodland	full	partial
<i>Tauraco porphyreolophus</i>	gallery forest	full	full
<i>Ruwenzorornis johnstoni</i>	forest	full	full
<i>Musophaga violacea</i>	gallery forest	full	partial
<i>Musophaga rossae</i>	gallery forest	full	partial
<i>Corythaixoides concolor</i>	acacia	nil	partial
<i>Corythaixoides personatus</i>	acacia	nil	partial
<i>Corythaixoides leucogaster</i>	acacia	nil	nil
<i>Crinifer piscator</i>	savanna	nil	nil
<i>Crinifer zonurus</i>	savanna	nil	nil



we accept that the absence or reduction of green in the plumage is adaptive, then the adaptation has perhaps taken place on three separate occasions: namely, with the plantain-eaters, where reduction of green is complete; with the go-away-birds, in which it is partial; and with the White-crested Turaco, where the reduction is incipient.

Since the green areas of the plumage of *Tauraco* species are far more extensive than the red parts, it is clear that at least 20 mg of copper will be present in the feathers as a whole. It has been shown that a copper content of two parts per million (2 ppm) is common in all fruits, while in young foliage this figure can be much higher. Therefore, if turacos are capable of extracting and utilizing, say, 1 ppm of copper from their food, the requirement for their plumage would be obtained by ingesting some 20 kg of fruit, which should be accomplished every two or three months in those species with both red and green in their plumage. Such power of selection would, however, seem to imply a considerable physiological specialization, and it seems remarkable that, within the same family of birds, some species should show absolutely no signs of possessing it. The apparent absence of turacoverdin in some plumages could, however, be misleading. The pigment may actually be present in the go-away-birds and the plantain-eaters but simply be excreted, with little or no deposition in the feathers.

All turacos have a short, strong bill with a curved culmen. This is ridged in some species, and extended backwards into a frontal plate in others. The extent to which the culmen is rounded, compressed or ridged varies between closely related species, notably the Eastern Grey Plantain-eater and the Western Grey Plantain-eater (*Crinifer piscator*), the Red-crested Turaco (*Tauraco erythrolophus*) and Bannerman's Turaco (*Tauraco bannermani*), and the Ruwenzori and the Purple-crested Turacos. Presumably, the degree of compression or ridging affects the strength of the bill, and such differences may be connected with some particularly hard food in the diet, or with fruit that is difficult to pluck. The nostrils or external nares vary considerably in

shape, from small slits to open circular apertures. They also vary in where they are positioned in the bill and, in some cases, are covered with feathers. The adaptive basis for such differences between otherwise very similar species is unknown. Peculiarities of the bill and nostril have in the past been cited as characters of the monotypic genera *Ruwenzorornis*, *Proturacus* (for Bannerman's) and *Gallirex* (for the Purple-crested), the last two of which are now defunct, but it is only *Ruwenzorornis* that shows other unique qualities.

All species of the genus *Tauraco* have bright red and/or striking black and white patterns on the sides of the head. The red generally consists of bare orbital skin surrounding the eye, but may, as in the Red-crested Turaco, be restricted to little more than the eyelids. In most cases, the facial pattern on the sides of the head takes the form of two white bars and a black patch, these three elements being present in combinations that vary considerably among individuals and races; in some they are greatly modified or even absent. It is assumed that they are important recognition marks, and they may act as isolating mechanisms.

The open-country go-away-birds and plantain-eaters are mainly grey, brown and white, to some extent matching their habitat. Plantain-eaters, however, differ from all other turacos in having the elongated feathers that produce the crest present only on the back of the head and on the nape. Furthermore, the form of the individual feather is itself unique in the entire turaco family. The shorter feathers of the forepart of the head show one specialization that is mirrored to some degree by the feathers of the front of the neck. Even if not actually bristly or spiky, they are all stiff to the touch and have the appearance of being broken off at the tip, since they consist of a few coarse barbs with the barbules reduced; this reduction in barbules is more marked on the head than on the neck.

The flight-feathers of turacos are moulted in an irregular and variable manner. It is reported that a perennial state of moult of the primaries is a character of the Green Turaco (*Tauraco persa*) and the Yellow-billed Turaco (*Tauraco macrorhynchus*). E. and V. Stresemann suggested that it can be best understood by simply considering the primaries as being divided into two groups: an inner one composed of the first five or six feathers, and an outer one comprising the last four or five. As a general rule, but



Most musophagids are medium-sized birds with short, rounded wings and a longish tail. The forest turacos are shy, spending most of their time moving furtively through the canopy, aided by their semi-zygodactylous toes. Unlike the toe arrangement of the cuckoos (*Cuculidae*), which have the outer, fourth, toe permanently reversed, the outer toe of turacos can be moved well back, or be brought forward so that it almost touches the third toe. Nearly all turacos have a conspicuous crest, the size, shape and colour of which are highly diversified in the genus *Tauraco*. The Knysna Turaco is one of a number of species with "helmet-shaped" crests.

[*Tauraco corythaix*, South Africa.
Photo: Roger Tidman/FLPA]

Recent studies indicate that the two turacos of the genus *Musophaga* probably diverged relatively recently from the main *Tauraco* line, developing a large frontal shield and huge deposits of melanin. In the *Tauraco* species, melanin is more or less restricted to the plumage of the back, wings, belly and tail. By contrast, the *Musophaga* species have melanin throughout their entire plumage, apart from areas of red on the head and wings. This dark pigment is extremely dense and produces a glossy bluish black look, as illustrated by this Violet Turaco.

[*Musophaga violacea*, Ivory Coast.
Photo: Roland Seitre/Bios]

Unlike their forest-dwelling relatives, the turacos living in open country are relatively dull in plumage, lacking the bright greens, blues and reds of the former. The species inhabiting savanna and acacia country are predominantly grey, white and brown, colours which to a large extent match their habitat. They all lack turacin, the pigment producing the bright red colours of other turacos, and also lack or have a greatly reduced and restricted amount of turacoverdin, the pigment which is responsible for the green colour shown by most of the Musophagidae. They do, however, retain the typical long tail and crested head of all turacos. This family shows little sexual dimorphism, and the male and female are generally indistinguishable in the field. The one exception is the White-bellied Go-away-bird, but even in this species the male and female differ only in bill colour: the male's bill is blackish, whereas the female has a pea-green bill which becomes yellowish during the breeding season.

[*Corythaixoides leucogaster*, Samburu, Kenya.
Photo: David Hosking/
FLPA]





A remarkable feature of most turacos is the presence of red turacin and green turacoverdin, two copper pigments which in the entire Animal Kingdom are unique to the Musophagidae. The brilliant red in their plumage is, for the most part, confined to the wings, crest and nape, and is most striking on birds in flight, as can be seen on this Schalow's Turaco. Turacin, a copper complex of an organic substance known as uroporphyrin 111, is present in surprisingly large quantities: indeed, the red plumage of a single turaco can yield as much as 8 mg of copper and 25 mg of pure uroporphyrin.

[*Tauraco schalowi*, Masai Mara Game Reserve, Kenya. Photo: Günter Ziesler]

not an invariable one, the moult starts with the loss of one feather from the inner group, usually the first primary, which is followed by primaries 2-5 in descendant order. The descendant sequence, however, may not be closely followed, and any feathers missed out are not shed until all feathers of the outer group have been moulted.

Habitat

Almost without exception, all arboreal habitats in sub-Saharan Africa are occupied by turacos. During the course of their evolution, members of the Musophagidae have colonized all types of forest and woodland, as well as bushed and wooded grassland. In many areas they are also found in well timbered suburban gardens.

Lowland, gallery and montane forests are clearly the most favoured habitats, and the Black-billed, Livingstone's and Great Blue Turacos are the most versatile ecologically. The Black-billed and Livingstone's Turacos have races resident in both lowland and montane forest, while the monotypic Great Blue appears equally at home in low humid equatorial rain forests, along gallery forests that stretch deep into the savanna belt, or at elevations of up to 2000 m in the highland cloud forests around the Albertine Rift.

The montane forests of Africa are important centres of endemism, harbouring a great number of species of various families which are found nowhere else in the world. Five allopatric species of turaco occur in these forests, all of them restricted to quite small and, in some cases, threatened habitats. These are Hartlaub's (*Tauraco hartlaubi*), the White-checked, Ruspoli's, Bannerman's and the Ruwenzori Turacos. Elsewhere, the Green, Yellow-billed, Fischer's (*Tauraco fischeri*) and Knysna Turacos are typically lowland-forest species, while the more open woodlands, along with gallery and riverine forests, are occupied by Schalow's (*Tauraco schalowi*), Purple-crested, Red-crested, White-crested, Violet and Ross's Turacos. While all forests continue to shrink and give way to subsistence agriculture, it is gallery forests that are being destroyed most rapidly, as the low-lying ground they occupy is being increasingly cultivated. In many areas, competition between fruit-eating birds and mam-

mals is becoming increasingly severe at certain times of the year.

The northern savannas of Africa are occupied by the two plantain-eaters, and the eastern and southern acacia habitats by the three go-away-birds. Whereas the Bare-faced and the Grey Go-away-birds are allopatric, the White-bellied Go-away-bird is to some extent sympatric with the Bare-faced in parts of the Ethiopian Rift and central Tanzania. In those areas of sympatry, it is likely that each species frequents and feeds on differing species of acacia.

A relatively small area of northern Angola near Malanje is, for some reason that is not clear, exceptionally rich in turaco species. This would normally not be expected, as the region in question lies between 500 m and 1000 m, and shows no great ecological diversity. It also lacks either rich lowland or typically montane evergreen forest. Rather, the main tree vegetation appears to consist of gallery forest and semi-deciduous woodlands, which themselves may well be relicts of earlier, more extensive areas of closed semi-evergreen forest. In this region, the Green Turaco enters from the north, the Black-billed from the north-east, and Schalow's from the south. While all three are allopatric, their ranges overlap that of the Red-crested Turaco, which is endemic to Angola. Furthermore, the Great Blue Turaco, a typical lowland-forest species, occurs in the same area, as also do Ross's Turaco, which is normally a gallery-forest species, and the Grey Go-away-bird, which is a characteristic bird of acacia country. It seems likely that at least some of the species live here under rather marginal conditions. Indeed, it is difficult to see how competition can be avoided, and it would be most interesting to know just what their ecological relationships are. It may be that the musophagid situation in northern Angola is a transitional one, brought about by recent changes in the vegetation, and liable to change rapidly as further deterioration follows human exploitation and degradation of the environment.

General Habits

The forest turacos belonging to the genera *Corythaeola*, *Tauraco*, *Ruwenzorornis* and *Musophaga* are shy, gregarious birds that only occasionally descend to the ground in order to bathe or drink.

The Musophagidae have, during the course of their evolution, succeeded in occupying virtually all arboreal habitats in sub-Saharan Africa. They have colonized not only all types of forest and woodland, but also savanna with trees or bushes, and in many areas can even be seen in well wooded suburban gardens.

The northern savannas are inhabited by the two plantain-eaters (Crinifer), while the three go-away-birds (Corythaixoides) are typical and noisy birds of the arid eastern and southern acacia belts, represented here by the Bare-faced Go-away-bird.

Most turaco species, however, live in forests, with a clear preference being shown for lowland, gallery and montane forests. The Great Blue Turaco is among the most versatile in terms of its habitat choice, living equally successfully in dense, humid equatorial rain forests, in cloud forests up to 2000 m, and along gallery forests, in some places extending a long distance into the savanna belt. Ross's Turaco generally avoids deep forest. It is one of several species found in tropical Africa's less dense woodlands, as well as in gallery and riverine forests, sometimes wandering out into more open areas with scattered trees.

[Above: *Corythaixoides personatus leopoldi*, Masai Mara Game Reserve, Kenya.
Photo: David Hosking/FLPA.

Centre: *Corythaeola cristata*, Rwanda.
Photo: Roland Seitre/Bios.

Below: *Musophaga rossae*, Masai Mara Game Reserve, Kenya.
Photo: Ferrero & Labat/Auscape]





All turacos are highly territorial, defending an area around the core of their territory from all intruders. Displays are marked by raising and lowering of the long crest accompanied by bowing and tail-flirting; in the *Tauraco* species, the wings are also spread to show off the startling red patches. The nest-site and the young are vigorously defended against any avian or mammalian intruder, no matter how large. In this instance, a Green Turaco is giving a threat display, apparently towards the photographer.

[*Tauraco persa buffoni*, Abuko Nature Reserve, Gambia.
Photo: Philip Perry/FLPA]

Despite being rather poor fliers, they move from tree canopy to tree canopy with remarkable agility. When finally they take flight, they will do so in single file with a short downward glide and a few fast flaps to the next tree, where each will climb and clamber back to the canopy with a series of short hops, leaps and bounds. The plantain-eaters of the savanna are much less agile than their forest relatives, and generally do not run or bound along tree branches. They take flight more readily and, like the three go-away-birds, they will cover longer distances with stronger and more buoyant flight. They also come to ground to drink far more frequently than those turacos living in forest habitats.

Turacos are highly vocal. Frequently, at dawn, a forest turaco will start calling, others nearby will reply, and within a few minutes all birds within earshot will be calling. Imagine that time in the past, when dawn could be heralded across the vast equatorial forests of Africa by groups of forest turacos calling to each other, all the way from the Ituri basin in eastern Zaire to the Atlantic Ocean. Daily activities then generally begin shortly after dawn, and feeding starts early. Later on, as the day warms up, members of a group will preen extensively and bask in the morning sun. A large part of the day is spent feeding, with preening and resting intervals, and a lull in activity occurs during the hottest midday period. After heavy rainstorms, much time is spent "drying out" with wings and tail often fully spread. Towards late evening, turacos begin to move to favourite roosting sites, showing a marked preference for tall leafy trees. Periods of prolonged, noisy calling may be a feature of these journeys to roost sites, as if the birds are encouraging others to join them.

All species of turaco are strongly territorial and remain in family groups for long periods, although most forest turacos live in territorial pairs throughout the year. Territories are generally composed of a core area in which the pair spends most of its time. The core is surrounded by a little-used peripheral area which is defended against intruders. All individuals frequently visit or "raid" other forest patches beyond their territorial borders for food, but they are invariably chased out if met by any resident turaco in those areas. Territory size varies considerably, from approximately 2 km² for the Great Blue and Ross's Turacos in western Kenya to an average of 4 ha per pair for Schalow's on the Nyika Plateau in Malawi, and 15 ha per pair for the Yellow-

billed Turaco in Gabon. Family groups of turacos may not necessarily feed on their closest available food source. At times they will travel quite large distances to reach a particularly favoured fruiting tree, often approaching and leaving it in single file and in total silence.

Species within the genus *Tauraco* are largely allopatric, but, in parts of Gabon where the Yellow-billed and the Green Turacos are sympatric, the former will invariably react aggressively towards the Green wherever the two encounter each other. Such behaviour suggests that the Green Turaco may have entered the dense humid forest in geologically recent times, there meeting and competing with the Yellow-billed. Elsewhere, however, individuals of different genera are often quite tolerant of each other's presence. In some Central African forests it is possible to see Great Blue, Ruwenzori and Black-billed Turacos all feeding in the same fruiting tree, showing aggression only towards other fruit-eating species and monkeys. Nevertheless, when called upon to defend a nest-site, or to protect young against any avian or mammalian intruder, all turacos will do so stoically.

Voice

Just as the raucous call notes of the forest turacos are among the most characteristic sounds of the African rain forests, so the plaintive, nasal calls of the go-away-birds are typical of Africa's acacia savannas.

The loud, resonant "kok-kok-kok" call of the Great Blue Turaco, which sometimes begins and usually ends with a softer, almost trill-like "pruu....pruu", is typically heard at dawn and dusk. This species' voice is always a notable feature of Africa's equatorial forest belt.

The calls of each one of the 14 species of the genus *Tauraco* differ only slightly in tempo and pitch. For the majority of species, the usual call is a loud, harsh barking, often preceded by a higher-pitched hoot. Its function appears to be mainly that of territorial advertisement. Generally, both members of a pair will sing, often in duet, and, in the case of the Green Turaco, one sex has a higher-pitched song than the other; the higher voice is thought perhaps to come from the female, although this is not known for certain. This sexual difference in vocal pitch also exists



The forest turacos are generally shy birds, far more often heard than seen. Their daily activities follow a particular pattern, with relatively little variation. After a bout of loud calling around dawn, followed by early feeding activity, they will then spend some time preening and sunning themselves as the morning temperature rises.

This Hartlaub's Turaco has raised the feathers of its plumage and partly spread its wings and tail in a classic sunning posture.

When turacos become excessively wet after heavy rainstorms, they will dry out their plumage as soon as the sun returns, in this case often resting for lengthy periods with the wings and tail held open to the fullest extent. Much of a turaco's day is, however, taken up with foraging and feeding, until the middle of the day, when, with the tropical sun at its hottest, the birds rest in shaded areas of the forest. Towards late evening, as they start to move to roosting sites in tall, leafy trees, they may once again indulge in much loud calling, before settling down for the night.

[*Tauraco hartlaubi*,
Nairobi suburbs, Kenya.
Photo: Dave Richards]



Almost all bird species need to bathe, at least on occasion, and turacos are no exception. Bathing is a part of the process of plumage maintenance, and is generally followed by extensive preening. The open-country turacos, such as the White-bellied Go-away-bird, will readily descend to the ground to bathe in rain: the wings and tail are widely spread, enabling rain drops to penetrate to each feather of the plumage. The forest turacos, on the other hand, are far less inclined to come to the ground, although they will do so occasionally in order to perform the important functions of drinking or bathing. This captive Red-crested Turaco, a very little known Angolan endemic inhabiting open broadleaf woodland and gallery and riverine forest, appears to have just bathed in a convenient source of water, a sight which would not be so easy to come across in the species' natural home. It is worth reiterating here that, contrary to the often repeated myth that turacin is washed out of the plumage by heavy rain, this pigment is in fact soluble only in alkali and in no other solution.

[Above: *Corythaixoides leucogaster*, Lake Baringo, Kenya. Photo: John Karmali/ FLPA.

Below: *Tauraco erythrolophus*. Photo: Kenneth W. Fink/ Ardea]

in other *Tauraco* species, but it is less pronounced than in the Green Turaco.

The calls of one individual will often stimulate others to respond, and the forest may resound with the birds' raucous calling during vocal periods. This is particularly noticeable in areas occupied by Hartlaub's and Black-billed Turacos. Where two or more species occur together, the calls of one will frequently bring about some quite aggressive responses from another. Such "countersinging" has been observed between Yellow-billed and Green Turacos in Gabon and between Black-billed and Ruwenzori Turacos in Rwanda. Although the normal call of the Ruwenzori Turaco is a series of weak "raw-raw" notes, similar to that of other green turacos, that species also has an extraordinary territorial call, a short explosive "tchick" followed by a rattle or sneeze, that is highly distinct from calls of *Tauraco* or *Musophaga* species.

The two *Musophaga* species, Ross's and the Violet Turacos, utter a long chorus of deep, rolling, gargling "cou-cou-cou-cou-cou-rhou-rhou" notes which tend to run into each other, producing a continuous, pulsating, almost monkey-like sound. This prolonged vibrant noise is even more emphasised when two or more birds call in duet.

The three species of the genus *Corythaixoides* all utter series of loud, plaintive, nasal notes which have resulted in the English name of go-away-bird being used for the group. In southern Africa, the call of the Grey Go-away-bird is described as "g'way, g'way", with the accent on the "way". That of the White-bellied Go-away-bird is a nasal "gaarr, wayrr", repeated several times and frequently given as a series of calls by two birds in asynchronous duet. The Bare-faced Go-away-bird utters a similar

nasal, almost sheep-like "go-ah, go-ah", while several birds together will frequently burst into a series of wild, ringing notes sounding almost like human laughter.

Finally, the two plantain-eaters give a series of high-pitched laughing or cackling "cow-cow-cow" or "how-how-how" notes, followed by a stuttering chatter which gradually fades away. In display flight, a low "ka" or "kalak-kalak-kalak" may accompany each wingbeat, the call varying between the species only in speed and pitch.

Food and Feeding

Turacos are almost exclusively vegetarian, feeding mainly on wild and cultivated fruits and, to a lesser extent, on foliage, flowers and buds. In addition, caterpillars, moths, beetles, snails, slugs and termites are also eaten by several species, particularly during the breeding season. Only the Yellow-billed Turaco is known to follow raiding swarms of ants in mixed-species flocks. Although the English name of plantain-eater is used for two species, and was formerly given to the family as a whole, neither plantains nor cultivated bananas form any part of the diet of any of these birds in the wild.

The Great Blue Turaco indulges in leaf-eating throughout the day, but this habit is particularly pronounced late in the evening. It also feeds regurgitated leaves to its nestlings from the time they reach the age of eight days. Despite their size, Great Blue Turacos are able to reach fruits at the end of very thin branches, thanks to their semi-zygodactylous toes; on occasions, they have been observed briefly hanging upside-down in order

The diet of the Musophagidae is almost totally vegetarian. These birds particularly favour fruits, both wild and cultivated, but some species will also take leaves, buds and flowers. A number of turacos add a few small invertebrates to their diet, but the Purple-crested Turaco appears to take nothing but fruit, especially figs, supplemented with occasional buds. In some parts of its range this species occurs in suburban parks, gardens and exotic plantations, and in southern Africa it regularly visits garden birdtables, where it readily consumes such delicacies as pawpaw (papaya), guava and mulberries, as well as maize-meal. Captive Purple-crested Turacos have been known to consume 134 g of food daily.

[*Tauraco porphyreolophus*
porphyreolophus,
KwaZulu-Natal,
South Africa.
Photo: Trevor Barrett/
Bruce Coleman]





The diet of the go-away-birds of acacia savannas is somewhat more varied than that of most forest turacos. In addition to fruit, they also eat the pods, leaves, buds and flowers of acacias and other plants in large quantities, as well as probing the flowers for nectar; the Grey Go-away-bird readily takes emerging termites. The White-bellied Go-away-bird shows a particular liking for the young green pods of *Acacia tortilis*, but it is not known to take termites in the same way as the Grey. Like their forest relatives, however, these open-country turacos also take much fruit. Indeed, the Grey Go-away-bird can be a major pest to man in some areas, raiding orchards and plantations where soft-skinned fruits and vegetables are cultivated. The open, dry habitats in which these turacos live mean that they are subject to similar constraints to those experienced by the savanna-dwelling plantain-eaters (*Crinifer*). All need to drink regularly, and in southern Africa flocks of up to 30 Grey Go-away-birds may be seen visiting isolated water sources. Fluctuating food and water supplies force them to make periodical local wandering movements, and in Zimbabwe, for example, it is not uncommon to see groups of over 50 Grey Go-away-birds moving purposefully in a set direction.

[Above: *Corythaixoides concolor*.
Photo: Clem Haagner/
Ardea.



Below: *Corythaixoides leucogaster*,
Lake Baringo, Kenya.
Photo: Gordon Langsbury/
Bruce Coleman]

Those musophagid species, like the Western Grey Plantain-eater, that occur in fairly open, dry habitats come to ground to drink far more frequently than do forest turacos, and their similar, almost daily requirement for water results in some local wandering in search of fresh supplies. The two plantain-eaters feed almost solely on fruits. Despite their English name, however, they do not eat either plantains or cultivated bananas in the wild; nor, indeed, does any other member of the Musophagidae, even though the name plantain-eater was formerly applied to the family as a whole.

[*Crinifer piscator*,
Abuko Nature Reserve,
Gambia.
Photo: Philip Perry/FLPA]



to reach particular fruits or berries. Although the Great Blue Turaco is larger and has a stronger bill than other members of the family, there is at present no evidence that it eats any particular food to which it might be more adapted than other turacos. In most parts of its range, it eats the same fruits as the smaller species.

Throughout the West and Central African forest zone, fruits of the parasol tree (*Musanga*) and the waterberry tree (*Syzygium*) are particularly favoured, and in areas where *Musanga*, *Polyalthia* and *Cissus* species have regular massive crops their fruits constitute the staple food of most forest turacos. Forest turacos are also considered important agents in the dispersal of seeds of indigenous trees.

In the acacia savannas, the go-away-birds have a more varied diet. This consists not only of fruit, but also of acacia buds, leaves and pods, and *Aloe* and *Erythrina* flowers, as well as emerging termite alates. All go-away-birds drink regularly, and in southern Africa parties of 20-30 Grey Go-away-birds have been recorded at favourite water sources. It is possible that this constant, almost daily need for water may be a limiting factor in their distribution. For example, Grey Go-away-birds are absent from apparently suitable habitat in the dry, waterless central and south-western Kalahari. On at least one occasion, a Grey Go-away-bird has been recorded carrying water in its bill to a nearby newly fledged young bird.

In the northern savannas of Africa, the two plantain-eaters feed almost exclusively on wild and cultivated fruits. In the upper Nile Valley of north-western Uganda, however, the Eastern Grey Plantain-eater reportedly eats the flowers of *Daniellia oliveri* in some quantity.

Breeding

All turacos breed solitarily, in territories which the pair defends strongly. While most species are probably monogamous, some go-away-birds are recorded as having helpers to defend the territory vocally and to assist with the feeding of young in the nest. Such helpers are possibly from a previous brood.

Courtship activity, generally stimulated by the onset of the rainy season, includes much calling and chasing from tree to

tree, mutual feeding, opening and closing of the bill, raising and lowering of the crest, flashing of head markings, bowing, and flirting of the tail, and, in the *Tauraco* species, much spreading of wings to display the crimson patches. The male Western Grey Plantain-eater is reported to rise vertically from the top of a tree and then descend in a tumbling dive to its mate, which remains perched with outstretched wings and tail.

All members of the family build a flat and often flimsy nest of sticks and twigs, very similar to those of doves and pigeons (Columbidae). Nests of the forest turacos are placed among thick foliage 5-20 m above the ground in trees or shrubs, but those of the go-away-birds are generally in acacias, often with little or no attempt at concealment. The clutch size of the savanna species is two or three eggs, whereas all other turacos normally lay just two eggs. The rounded eggs vary in colour from white or greyish white to cream, glossy bluish white or even pale ivory-green. Incubation is carried out by both sexes, and varies from 16-18 days in Hartlaub's to 24-26 days in Ross's and the violet, and 29-31 days in the Great Blue Turaco.

The young hatch at what is, for nidicolous birds, a comparatively advanced stage of development. They have a thick coat of black, grey or brownish down and, in some species, a well developed wing-claw. Their eyes are either open or on the point of opening. The nestlings are fed by regurgitation, and in most species the parents will swallow their chicks' faeces as soon as they are discharged. The young become very active when between two and three weeks old, commonly leaving the nest to clamber about in the surrounding branches long before they can fly. Most make their first flight at four or five weeks, but remain dependent on their parents for some time longer. Young Great Blue Turacos are fed for up to three months after leaving the nest.

While there are few data on breeding success, the African Goshawk (*Accipiter tachiro*) is known to prey heavily on turacos and their nests whenever the opportunity arises. In addition, there are several instances of nests of Great Blue and Ross's Turacos having been raided by blue monkeys (*Cercopithecus mitis*) and by snakes such as the forest cobra (*Naja melanoleuca*). A total of 18 Great Blue Turaco nests, kept under observation during the period from October 1976 to March 1981, gave the following results: from 37 eggs which were laid, 14 young hatched and 11 survived to fledging. Similarly, out of 12 nests of Ross's



All members of the Musophagidae build a flat nest of sticks and twigs, often flimsy, and very like the platform-type constructions of doves and pigeons (Columbidae). The nests of forest turacos, including the Purple-crested Turaco, are sited as much as 20 m above ground in a tree or shrub, usually well concealed among creepers or other thick foliage. The normal clutch is two eggs, which are rather rounded in shape and vary in colour from white to pale greenish; they are incubated by both sexes for 16-31 days, depending on the species. The incubation period of the Purple-crested Turaco is 22-23 days, but that of some other species still remains to be established.

[*Tauraco porphyreolophus porphyreolophus*, South Africa.
Photo: Peter Steyn/Ardea]

Turacos, three were abandoned before laying had started; six clutches totalling 12 eggs hatched, and seven young fledged successfully, while five chicks were killed by predators.

Movements

Most forest species are highly sedentary. Some gallery and riparian species, however, in particular Ross's Turaco and the Purple-crested Turaco, are known to appear periodically at fruiting trees in areas from which they are normally absent. Also in association with the rains, there may be some seasonal dispersal away from the riparian growth into nearby woodlands, again to take advantage of food availability.

Similarly, the plantain-eaters and the go-away-birds inhabiting the savanna and acacia areas undertake some local wandering from time to time in relation to fluctuating food and water supplies. Groups of 50 or more Grey Go-away-birds are not uncommonly encountered in Zimbabwe, moving purposefully in a particular direction.

During periods of drought, or when certain fruits are in short supply, several montane-forest turacos will move altitudinally to feed on alternative food sources.

Relationship with Man

Turacos have long been exploited by man. They have been hunted not only for their brilliant red flight-feathers, which are used as adornments by African royalty and elders, but also for the pot.

Several early explorers mentioned that they made good eating. Notable among these was François Levaillant, who wrote: "I killed...a great number of tauracos, of which we made fricassees, much superior to those made of Guinea-hens or partridges with the same sauce."

In South Africa, legend has it that the Zulu king, Cetshwayo, would permit the feathers to be worn by no-one but himself, although it is believed that they were worn by his 18,000-strong Mbonambi regiment at the battle of Isandhlwana in January 1879, when a British force of 800 was wiped out almost to a man. In East Africa, the feathers from Schalow's and Hartlaub's Turacos are regularly seen in ceremonial headdresses of the Masai tribe, while in West Africa, in Cameroon, a porcupine quill and a red flight-feather from Bannerman's Turaco in a man's black hand-woven hat indicate his position as a *chindoh* or traditional council member.

Throughout southern Africa, the Grey Go-away-bird has long been a bird of ill repute among hunters. The latter will claim that it deliberately warns wild game of their approach, and it does indeed seem to be true that antelopes and other ungulates are alerted by the bird's loud cries. The Grey Go-away-bird is also highly destructive of soft-skinned fruit and vegetables in places where these are grown on a large scale in orchards and horticultural plantations.

In recent years, several species of turaco have adjusted to suburban conditions in many parts of Africa. Today, Hartlaub's Turaco is a common species in the well timbered western and northern suburbs of Nairobi, just as the Purple-crested Turaco has adapted to suburban life in Durban, Lilongwe and Harare, and the Grey Go-away-bird to a similar existence in Johannes-



Young turacos of all species are nidicolous and altricial, being entirely dependent on their parents for warmth and nourishment. Nevertheless, the chicks, on hatching, are relatively well advanced in their development, having a thick coat of dark downy feathering and with their eyes open or on the point of opening. They become very active when two to three weeks old, frequently leaving the nest, but they can not fly for a further two weeks. The newly hatched chicks of Hartlaub's Turaco, a fairly common East African endemic, are reasonably typical of the family. They are covered in black down, and are fed frequently, by both parents, on caterpillars and regurgitated fruit pulp; by 18 days old they can clamber all over the nest tree, spending very little time in the nest itself, and at four weeks of age they are capable of flight. It is interesting to note that this species' incubation period of 16-18 days is the shortest in any turaco.

[*Tauraco hartlaubi*,
Kenya.

Photo: Michael Gore/
FLPA]



The nests of the Grey Go-away-bird and its two congeners are similar to those of other turacos, but are generally built in acacias and, unlike those of forest turacos, are easily visible. These birds normally lay three eggs, which hatch asynchronously, but in their brood-rearing behaviour and in the development and behaviour of the nestlings they follow the same pattern as the rest of the family. Turacos are solitary breeders, and are apparently monogamous, but some go-away-birds may have helpers at the nest, possibly birds from a previous brood, which defend the territory vocally and assist with the feeding of nestlings.

[*Corythaixoides concolor*, Nylsvley, South Africa. Photo: Warwick Tarboton]

burg. Around Kampala and Entebbe in Uganda, the Eastern Grey Plantain-eater is plentiful.

Status and Conservation

As forests and savanna habitats throughout Africa continue to succumb to human pressure, all turacos face varying degrees of threat. Those most threatened are the isolated forest endemics, whose small ranges and often severely fragmented habitats face imminent clearance. As a result, both Bannerman's and Ruspoli's Turacos are currently listed as globally threatened species, with Fischer's Turaco listed as near-threatened.

Bannerman's Turaco is restricted to the Bamenda-Banso Highlands of western Cameroon, and is one of the most threatened bird species in Africa. It is under threat from forest clearance in an area where its habitat had already been reduced by 50% during the twenty-year period from 1965 to 1985, and its continued survival is possible only if the forests on Mount Oku and Mount Ijim are safeguarded. Bannerman's Turaco is a bird of the mid-stratum and canopy levels of the forest, but it is able to survive in damaged secondary forest provided sufficient tall fruiting trees remain. For decades, traditional leaders had been granting farmers the right to clear demarcated areas of forest in order to create new farms. This process was gradual, until world coffee prices began to crash in the early 1980's. Farmers dependent on coffee for income started searching for an alternative cash crop. Noticing that there was a good market for excess beans grown by the women, they seized upon the opportunity. However, they urgently needed more land on which to grow their new crop. They also realized that the small beans grew better at high altitudes and in the fertile soil of newly cleared forest. The demand for forest farms therefore increased dramatically. The continuing forest clearance combined with rampant bush fires meant that, within five years, a vast area of the habitat of Bannerman's Turaco would disappear. As a result, intensive conservation work has been directed towards this area by BirdLife International: farmers who had earlier set their sights on the rich forest soil have been quickly offered an alternative means of income and new farming techniques to ensure the future sustainable use of the forest and its surrounding environ-

ment, together with the saving of this globally threatened species.

Ruspoli's Turaco has a very small and fragmented range in southern Ethiopia, where it lives in juniper forest, mixed broadleaf woodland and acacia woods. Recent surveys suggest that it may



With their attractive plumage, turacos have long been popular among aviculturalists, whose numbers have grown rapidly in recent decades. The long crest of Schalow's Turaco has made this a particularly sought-after species, while in East Africa its feathers are prized by the Masai tribesmen for use in their ceremonial head-dresses. Captive-breeding programmes, involving several turaco species, are now firmly established in many zoos and bird gardens, enabling valuable studies to be made of the birds' behaviour and biology. Appropriate legislation would ensure that only captive-bred turacos were supplied to meet the demands of the many private collections and breeders.

[*Tauraco schalowi*, San Diego Zoo, California, USA. Photo: Kenneth W. Fink]

The continuing clearance of African forests for human exploitation is a serious threat to many bird species, and three turacos are considered threatened or near-threatened. One of these is Fischer's Turaco, which is restricted to a relatively small area of coastal forest from southern Somalia and eastern Kenya to north-eastern Tanzania. The fragmentation of these forest habitats, which continue to diminish in size, poses a serious threat to this species, which is currently considered to number no more than 2000 individuals.

[*Tauraco fischeri*,
Kenya.

Photo: Roland Seitre/Bios]



in fact prefer drier woodlands to forest, and that competition with the White-cheeked Turaco may not after all be a factor in its apparent scarcity. Unfortunately, human pressure and demands for wood-cutting and grazing land are increasing throughout southern Ethiopia. As with Bannerman's Turaco, there is now an urgent need for conservation bodies to implement recommendations for the permanent safeguarding and protection of the preferred habitat of Ruspoli's Turaco.

Since coastal forests in eastern and southern Africa are small, and are generally surrounded by dense human populations, deforestation is particularly severe and is a continuing process. In these fragmented forests, Fischer's Turaco and, to a lesser extent, the Knysna Turaco are being seriously affected. Fischer's has a particularly restricted and diminishing range in southern Somalia, coastal Kenya and north-eastern Tanzania, with a total population of fewer than 2000 birds.

Elsewhere in East Africa, the Purple-crested Turaco is considered a regionally near-threatened species because of continuing habitat loss and the permanent degradation of its gallery and riverine habitats. It is now feared that its overall regional population in East Africa is in serious decline.

The Red-crested Turaco is endemic to war-torn Angola. With clearance of the submontane forests on the Angola Escarpment and continuing degradation of its broadleaf woodlands, it is thought that this species could be facing important habitat loss.

In total contrast, the giant of the family, the Great Blue Turaco, a unique isolated genus without any near relatives, remains the most widespread species in the Musophagidae: it occurs in all 22 countries embracing the equatorial forest belt. Despite its huge size, there is nothing to suggest that it has adapted to any special aspect of its forest environment or to a particular food source, as it shares both with several smaller species. Although hunted over much of West Africa, it remains fairly common throughout its extensive range, with deforestation the main threat.

Although not immediately threatened, several turaco species are listed as birds of restricted range: defined as species with a total distribution that covers an area of less than 50,000 km². For example, Hartlaub's Turaco, the Ruwenzori Turaco and the Bare-faced Go-away-bird qualify for this category, and are birds whose conservation should be dealt with at the East African regional level. Together with its various regional partners in Africa,

BirdLife International is the leader in identifying species which face varying degrees of threat, and is active in its efforts to help conserve and safeguard endangered species and their habitats. The recent drawing-up of endemic bird areas (EBA's) is a major step forward in identifying priority areas for global and regional conservation.

Sadly, the trapping and export of turacos has had its effect on some species. In Tanzania, the export of Hartlaub's, Fischer's, Livingstone's and the Purple-crested Turacos reached quite alarming proportions prior to 1994; fortunately, all trade in birds is now regulated under a Government quota system whereby licensed exporters are required to obtain minimum foreign-exchange values for the birds they export. Similarly, the hundreds of turacos that are exported annually from Guinea, Sierra Leone, Liberia and Ghana are giving much cause for concern; if sustained on the current scale, this trade will clearly deplete populations of the Violet, Green and Great Blue Turacos in those parts of West Africa. Meanwhile, the Wildlife Trade Monitoring Unit of IUCN maintains a watchful eye on all aspects of trade in wildlife, including that involving turacos. With stricter controls now in force in most European Union countries and other parts of the world, it is hoped that the importation of wild turacos from Africa will be reduced.

Many zoos and bird gardens around the world have now established highly successful captive-breeding programmes involving several species of turaco, and valuable data are becoming available from studies of these captive-bred birds. It is very much to be hoped that, in the very near future, legislation will ensure that only such birds bred in captivity will be available to the hundreds of private aviaries and turaco-breeders that have proliferated in recent years.

General Bibliography

Berger (1960), Bock (1994), Boetticher (1955), Brom (1991), Brush & Witt (1983), Burton (1971), Chapin (1963), Clay (1947), Ellis (1993), Gysels (1969), Hancock (1996), Lowe (1943), Mayr & Amadon (1951), Moreau (1938, 1958, 1959a, 1959b), Peters (1940), Schalow (1886), Schroeder (1991), Slater (1924), Seibel (1988), Sibley & Ahlquist (1972, 1990), Sibley & Monroe (1990), Snow (1978), Stresemann & Stresemann (1966), Thompson (1991), van Tuinen & Valentine (1986), Turner & Grimes (1985), Verheyen (1956a).

inches 6
cm 15

PLATE 56

1



ssp buffoni

2



ssp persa

ssp livingstonii

3



ssp reichenowi

4



5



ssp corythaix

ssp phoebus

ssp schuetti

6



ssp emini

7



ssp verreauxii

8



9



ssp macrorhynchus

10



11



Subfamily CORYTHAEOLINAE

Genus *CORYTHAEOLA* Heine, 1860

1. Great Blue Turaco

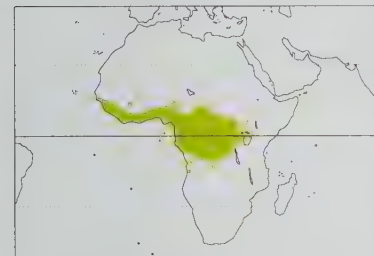
Corythaeola cristata

French: Touraco géant **German:** Riesenturako **Spanish:** Turaco Gigante
Other common names: Great Turaco, (Great) Blue Plantain-eater

Taxonomy. *Musophaga cristata* Vieillot, 1816, Sierra Leone.

E African birds formerly separated in race *yalensis*. Monotypic.

Distribution. Equatorial Africa from Guinea Bissau, Guinea, Liberia and Ivory Coast E to Nigeria, Central African Republic, Cameroon, Bioko (Fernando Po), Gabon, N Angola, Congo, Zaire, S Sudan, Uganda, Rwanda, Burundi, NW Tanzania and W Kenya.



Descriptive notes. 70-75 cm; male 857-949 g, female 822-1231 g. Readily identified by large size and predominantly grey-blue or greenish blue and yellow plumage; crest blue-black; long, wide tail with broad black subterminal band, narrow blue tip in most birds; belly, tibial feathers and undertail-coverts chestnut; no red in wings; large bill bright yellow, tipped red; eye dark red; orbital skin blackish; legs and feet blackish. Sexes alike. Immature duller, with smaller crest.

Habitat. Lowland, intermediate and montane rain forest, as well as heavy gallery forest; where not molested or persecuted, survives well

in small relict forest patches. Sea-level to 2700 m.

Food and Feeding. Largely frugivorous, but buds, shoots, leaves and flowers also taken. In W Africa favours fruits of *Musanga*, also *Cissus*, *Polyalthia*, *Heisteria*, *Ficus*, *Dacryodes*, *Pachypodanthium*, *Uapaca*, *Strombosia*, *Trichilia*, *Drypetes*, *Viscum*, *Beilschmiedia*, *Coelocaryon*, *Croton* and *Pycnanthus*; some insects also taken. In W Kenya eats fruits of *Bridelia micrantha*, *Cordia abyssinica* and, when available, large quantities of loquats (*Eriobotrya japonica*) and guavas (*Psidium guajava*); also takes fruits of *Olea welwitschii* and *Ficus thonningii*, and flowers of *Markhamia platycalyx*. Leaves are readily eaten throughout the day, but leaf-eating particularly pronounced in the evening; regurgitated leaves fed to nestlings.

Breeding. May in Nigeria; Feb, May-Jul and Sept-Dec in Cameroon; Mar, Aug-Sept and Dec in Gabon; Mar-Apr and Sept in Zaire (Itombwe); Jan-Jul, Sept and Nov-Dec in Uganda and W Kenya. Nest usually a platform of dry sticks with a shallow rim, built by both sexes at 8-25 m in tall leafy tree, often over water. Generally 2 eggs, pale bluish green and almost spherical; incubation 29-31 days, by both sexes. Once young hatched, parents most attentive and one always in attendance at nest day and night until nestlings 27-29 days old; young fed by both parents, often assisted by a helper; in 4th week nestlings climb in and out of nest, at 27-33 days make short flights in the tree, finally leaving nest at 31-38 days. Parents remain close by until young 45 days old and able to fly more strongly; continue to feed young for up to 3 months.

Movements. Groups of 6-7 birds, occasionally more, maintain territories throughout year; solitary individuals rare. Frequently moves some distance to favoured fruiting trees, returning daily for several days in succession, but generally approaching the tree silently, and leaving one at a time. Several groups often congregate at large fruiting trees near borders of territories.

Status and Conservation. Not globally threatened. Most widespread of all turacos, and seems not uncommon in most of range. Locally common in W Uganda. Although adaptable to some extent, and able to accept smaller areas of forest if not persecuted, numbers in Nigeria greatly depleted by unremitting deforestation. Hunted widely over much of W Africa, where considered a delicacy by local inhabitants; despite such pressure, still widespread and common in Sierra Leone. Trapping for export could result in depletion of some populations. Nests may occasionally be raided by blue monkeys (*Cercopithecus mitis*) and by snakes, but this appears not to be a great problem. CITES III in Ghana.

Bibliography. Bannerman (1933, 1953), Bates (1927), Britton (1980a), Brosset & Erard (1986), Brown & Britton (1980), Candy (1984), Cave & Macdonald (1955), Chapin (1939), Cheke & Walsh (1996), Colston & Curry-Lindahl (1986), Dowsett (1989, 1990), Dowsett & Dowsett-Lemaire (1991), Dowsett & Forbes-Watson (1993), Lutson & Branscombe (1990), Elgood *et al.* (1994), Fry *et al.* (1988), Grimes (1987), Hauser & Wrangham (1990), Jackson & Sclater (1938), Lewis & Pomeroy (1989), Lippens & Wille (1976), Louette (1981), Mackworth-Præd & Grant (1957, 1962, 1970), Nikolaus (1987), Pérez del Val (1996), Pinto (1983), Reinhard & Blaskiewicz (1981), Rutgers & Norris (1972), Short *et al.* (1990), Snow (1978), Sun & Moermond (1997), Thiollay (1985), Zimmerman (1972), Zimmerman *et al.* (1996).

Subfamily MUSOPHAGINAE

Genus *TAURACO* Kluk, 1779

2. Green Turaco

Tauraco persa

French: Touraco vert **German:** Guineaturako **Spanish:** Turaco de Guinea
Other common names: Green Lourie, Guinea/Green-crested Turaco

Taxonomy. *Cuculus Persa* Linnaeus, 1758, Ghana.

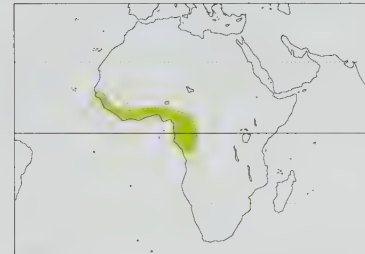
Forms a superspecies with *T. livingstonii*, *T. schalowi*, *T. corythaix*, *T. schuetti* and *T. fischeri*, a complex of allopatric forms formerly treated variably either as a single polytypic species or as three, five or six species. Three subspecies recognized.

Subspecies and Distribution.

T. p. buffoni (Vieillot, 1819) - Senegambia to Liberia.

T. p. persa (Linnaeus, 1758) - Ivory Coast and Ghana E to Mt Cameroon and Bamenda Highlands.

T. p. zenkeri (Reichenow, 1896) - S Cameroon, Gabon, N Angola, Congo and NW Zaire.



Descriptive notes. 40-43 cm; 225-290 g. Adult has head and erectile crest, neck, breast and mantle grass-green; lower back, rump and tail dull blackish with metallic violet and purplish gloss; belly and undertail-coverts dull black; remiges bright crimson, bordered and tipped with black; white loreal patch adjoining narrow black stripe under eye, variably bordered below by narrow white one; eye brown with scarlet eyelid; bill brownish red with black tip; legs and feet blackish. Immature similar, but with more extensive black tipping to primaries. Races differ mainly in head markings: nominate *persa* has white line under eye broadest

and longest (extending behind eye), and often slightly reddish tinge to tips of crest feathers; *zenkeri* has narrow and short white line below eye, faint purplish tinge to tips of crest; in *buffoni* white stripe below eye generally absent or barely visible, crest often without red or purple tips.

Habitat. Widespread in W African lowland and gallery forests; generally prefers areas of older secondary growth, particularly at edges of cultivation and along rivers and other watercourses. Typically from sea-level to 1100 m, but to 1385 m in Bamenda Highlands, Cameroon.

Food and Feeding. Wide variety of wild and cultivated fruits, also flowers and buds. In Gabon eats fruits of *Musanga*, *Ficus lingua*, *Phoenix reclinata*, *Heisteria parvifolia*, *Coelocaryon*, *Polyalthia*, *Rauwolfia*, *Macaranga*, *Cissus* and *Solanum*.

Breeding. Breeds May-Jun and Aug in Cameroon, Dec-Feb and Jun-Sept in Gabon; records in Jun and Oct in Sierra Leone. Nest a roughly built platform of sticks and twigs, interlaced with fine twigs, bulkier than that of a dove (Columbidae), and 1.5-5.3 m above ground in thickest part of an isolated bush or tree. Generally 2 eggs, creamy-white without gloss and almost spherical in shape; incubation 21-23 days, by both sexes; young remain in nest 26-28 days, making their first flight at 38 days; in Gabon 2 nestlings seldom raised, 1 generally disappearing shortly after hatching. Fledglings dependent upon parents for up to 14-15 weeks.

Movements. Largely sedentary throughout its W African range; in Gabon strongly territorial, with pairs maintaining a territory all year. Individuals occasionally wander seasonally to riverine and gallery forests in search of food, but no regular movements.

Status and Conservation. Not globally threatened. CITES II. Fairly common and widespread over much of its range, but no real information on numbers. No data on densities, but territories in Gabon normally c. 15 ha. In Sierra Leone, particularly abundant in gallery forests.

Bibliography. Bannerman (1933, 1953), Bates (1930), Brosset & Erard (1986), Chapin (1939), Cheke & Walsh (1996), Colston & Curry-Lindahl (1986), Decoux & Erard (1992), Dowsett (1989), Dowsett & Dowsett-Lemaire (1991, 1993), Dowsett & Forbes-Watson (1993), Dowsett-Lemaire & Dowsett (1988), Elgood *et al.* (1994), Fry *et al.* (1988), Good (1952), Gore (1990), Grimes (1987), Horne (1991), Jensen & Kirkeby (1980), Lamarche (1980), Lippens & Wille (1976), Louette (1981), Mackworth-Præd & Grant (1962, 1970), Morel & Morel (1990), Pinto (1983), Roles (1971), Rutgers & Norris (1972), Snow (1978), Thiollay (1985), Wachter (1993), White (1965).

3. Livingstone's Turaco

Tauraco livingstonii

French: Touraco de Livingstone **German:** Livingstoneturako **Spanish:** Turaco de Livingstone
Other common names: Livingstone's Lourie

Taxonomy. *Turacus livingstonii* G. R. Gray, 1864, southern Malawi.

A member of the *T. persa* superspecies. Formerly treated as conspecific with *T. schalowi* and *T. corythaix*, but vocal differences and cytogenetic researches point to specific recognition. Three subspecies recognized.

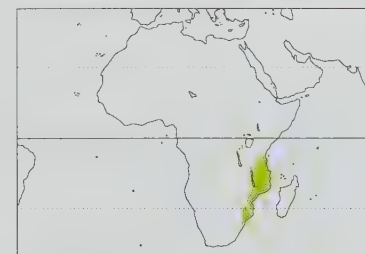
Subspecies and Distribution.

T. l. reichenowi (Fischer, 1880) - Nguru and Uluguru Mts SE to Dabaga and Njombe Highlands, Tanzania.

T. l. cabanisi (Reichenow, 1883) - coastal lowlands of Tanzania S of R Mligasi through Mozambique to NE Zululand.

T. l. livingstonii (G. R. Gray, 1864) - highlands E of the Rift in Malawi and adjacent N Mozambique, S to E Zimbabwe (Inyanga to Mt Selinda).

Small disjunct population in E Burundi and W Tanzania not racially assigned.



Descriptive notes. 45-46 cm; male 280-380 g, female 262-350 g. Adult has long green crest, tipped white; upperparts vary racially, from green to blue; belly and undertail-coverts dull black; remiges bright crimson with black tips; white stripe from gape to front of eye separated from one running under eye to ear-coverts by small black loreal patch; eye brown; orbital skin red; bill pinkish red. Immature duller than adult, with shorter crest, darker bill. Races vary remarkably in colour: nominate has mantle, scapulars, wings and tail dark green, feathers with broad emerald edges imparting scaled effect, crest 65-75 mm; *cabanisi* has mantle green, but scapulars, wings and tail dull bluish with violet tinge; *reichenowi* similar to previous, but scapulars, wings, rump and tail much deeper blue, crest less than 65 mm.

Habitat. Coastal and montane evergreen forest, from sea-level to 2500 m.

On following pages: 4. Schalow's Turaco (*Tauraco schalowi*); 5. Knysna Turaco (*Tauraco corythaix*); 6. Black-billed Turaco (*Tauraco schuetti*); 7. Fischer's Turaco (*Tauraco fischeri*); 8. Yellow-billed Turaco (*Tauraco macrorhynchus*); 9. White-crested Turaco (*Tauraco leucolophus*); 10. Bannerman's Turaco (*Tauraco bannermani*); 11. Red-crested Turaco (*Tauraco erythrolophus*).

Food and Feeding. Primarily a fruit-eater. In Malawi diet overlaps greatly with that of *T. schalowi*, 80% of species consumed being common to both.

Breeding. Breeds Oct-Dec in Malawi, Dec-Jan and Jun in Mozambique, Sept-Feb in Zimbabwe. Nest a well-woven platform of sticks and twigs some 3-10 m above ground in thickest part of a bush or tree. Lays 2 white and smooth-shelled eggs; incubation 22-23 days, by both sexes.

Movements. Largely sedentary throughout its range.

Status and Conservation. Not globally threatened. CITES II. Fairly common over much of its range, but continuing forest clearance will ultimately have adverse effect on all races. Some Tanzanian populations subject to indiscriminate trapping and subsequent export, although this potential threat now on a smaller scale than in years preceding 1994.

Bibliography. Benson & Benson (1977), Britton (1980a), Clancey (1952, 1989a, 1992, 1996), Dillingham & Moreau (1961), Dowsett & Dowsett-Lemaire (1993), Dowsett & Forbes-Watson (1993), Dowsett-Lemaire (1989), Dowsett-Lemaire & Dowsett (1988), Evans & Anderson (1992), Friedmann & Loveridge (1937), Fry *et al.* (1988), Ginn *et al.* (1989), Mackworth-Praed & Grant (1957, 1962), Maclean (1993), Newman (1996), Russell (1981b), Rutgers & Norris (1972), Short *et al.* (1990), Sinclair (1987), Snow (1978).

4. Schalow's Turaco

Tauraco schalowi

French: Touraco de Schalow

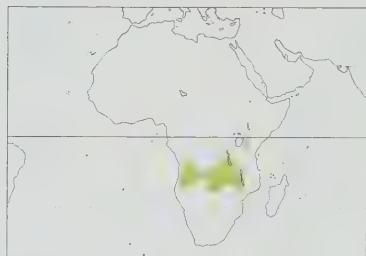
German: Schalowturako

Spanish: Turaco de Schalow

Taxonomy. *Corythaix schalowi* Reichenow, 1891, Angola.

A member of the *T. persa* superspecies. Formerly considered conspecific with *T. livingstonii* and *T. corythaix*, but vocal differences and analysis of chromosome banding suggest specific recognition more appropriate. Several races described for E populations, including *marungensis*, *loitanus* and *chalcophilus*, but all of doubtful validity. Monotypic.

Distribution. W, C & E Angola (N to Malanje and Calandula), S Zaire and Zambia to Zimbabwe (W of Victoria Falls), Malawi (W of the Rift), and W Tanzania from Ufipa to Gombe Stream National Park; smaller disjunct population in SW Kenya and N Tanzania from Mara Game Reserve and Loita Hills S to N & W Serengeti National Park, Crater and Mbulu Highlands and Mt Hanang, and W to Mwanza District.



Descriptive notes. 41-44 cm; male 236-261 g, female 208-267 g. Similar to *T. livingstonii*, but with longer and more attenuated crest (80-112 mm), more greenish mantle and wings, paler green underparts, and deep bluish black to violet tail; white line under eye present on most individuals, but may be greatly reduced or even absent on N Tanzanian birds.

Habitat. Gallery or evergreen forest, thickets and riparian woodland, from 600 m to 2500 m.

Food and Feeding. Primarily a fruit-eater. On Nyika Plateau in Malawi, favours *Cryptocarya liebertiana*, *Drypetes gerrardii*, *Cassine*

ethiopica, *Podocarpus latifolius*, *Olea capensis*, and *Syzygium* and *Rapanea* species.

Breeding. Breeds Dec-Mar in SW Tanzania, Jul-Oct in Kenya, Oct-Dec in Malawi, and Oct-Jan in Zambia. Nest a flimsy structure of sticks some 3-10 m above ground in thickest part of tree or bush. Lays 2 oval eggs, white without gloss; incubation 20-22 days, by both sexes.

Movements. Largely sedentary throughout its range.

Status and Conservation. Not globally threatened. CITES II. Common on Nyika Plateau, Malawi, where 43 small areas of forest totalling 157 ha contained 39 pairs, giving average territory 4 ha/pair.

Bibliography. Benson & Benson (1977), Benson *et al.* (1971), Britton (1980a), Chapin (1939), Dowsett & Dowsett-Lemaire (1993), Dowsett & Forbes-Watson (1993), Dowsett-Lemaire (1983), Dowsett-Lemaire & Dowsett (1988), Fry *et al.* (1988), Ginn *et al.* (1989), Jackson & Selater (1938), Lewis & Pomeroy (1989), Lippens & Wille (1976), Mackworth-Praed & Grant (1957, 1962, 1970), Maclean (1993), Newman (1996), Newman *et al.* (1992), Pinto (1983), Rutgers & Norris (1972), Short *et al.* (1990), Sinclair (1987), Snow (1978), Zimmerman *et al.* (1996).

5. Knysna Turaco

Tauraco corythaix

French: Touraco louri

German: Helmturako

Spanish: Turaco de Knysna

Other common names: Knysna Lourie

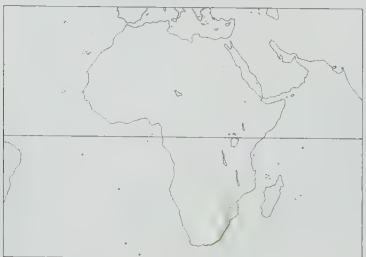
Taxonomy. *Spelectos corythaix* Wagler, 1827, Cape of Good Hope.

A member of the *T. persa* superspecies. Formerly considered conspecific with *T. livingstonii* and *T. schalowi*, but differences in vocalizations and chromosome-banding analysis suggest otherwise. Two subspecies recognized.

Subspecies and Distribution.

T. c. phoebus Neumann, 1907 - E & N Transvaal and NW Swaziland.

T. c. corythaix (Wagler, 1827) - Natal, W Zululand and S Swaziland to S & E Cape Province.



Descriptive notes. 45-47 cm; male 280-380 g, female 262-350 g. Adult has rounded, erectile, "helmet-like" crest green, tipped white; head, neck, breast and mantle bright green; tail, rump, back, scapulars and wing-coverts dark metallic green with emerald and violet-blue glosses; belly and undertail-coverts dull blackish, washed with green; remiges bright crimson with blackish tips; white stripe from gape to top of eye is separated from one running under eye to ear-coverts by small black loreal patch; eye brown, orbital ring red; bill orange-red; legs blackish. Immature duller than adult, less red in wings, crest shorter and bill olive-

brown. Race *phoebus* similar, though with more intense steel-blue gloss on back and wings.

Habitat. Coastal and inland evergreen forest, from sea-level to 1800 m.

Food and Feeding. Although primarily a fruit-eater, particularly favouring *Rothmannia capensis*, *Rapanea melanophloeos*, *Apodytes dimidiata* and *Olea capensis*, will also eat with impunity the fruits of bushman's poison (*Acokanthera spectabilis*), which are highly toxic to mammals. Also

takes seeds, leaf buds of *Bauhinia* and *Ficus*, and flowering heads of the cabbage-tree (*Cussonia*). In captivity, total fruit intake was 124 g/day, and parents actively searched for insects and earthworms during chick-feeding stage, but not at other times.

Breeding. Breeds Nov-Jan and Jun-Jul in S & E Cape Province, Aug-Nov in Natal. Nest a shallow platform of sticks, much like that of a large dove (Columbidae), c. 2-9 m above ground in leafy tree or among dense creepers. Lays 2, occasionally 3, smooth white eggs; incubation 23-26 days, by both sexes; young fed by regurgitation, remain in nest for 22-26 days, making first flight at 28-35 days, but dependent upon parents for several weeks more.

Movements. Mainly sedentary throughout its range.

Status and Conservation. Not globally threatened. CITES II. A fairly common resident over much of its range, but the ever-shrinking extent of coastal forests in Cape Province and adjacent areas will ultimately affect the population of nominate *T. c. corythaix*.

Bibliography. Clancey (1964b, 1975, 1989a), Courtenay-Latimer (1942), Dowsett & Dowsett-Lemaire (1993), Dowsett & Forbes-Watson (1993), Dowsett-Lemaire & Dowsett (1988), Fry *et al.* (1988), Ginn *et al.* (1989), Huisamen (1995), Jarvis & Currie (1979), Jubb (1965), Mackworth-Praed & Grant (1962), Maclean (1993), Newman (1996), Rowan (1983), Russell (1981b), Rutgers & Norris (1972), Sinclair (1987), Snow (1978).

6. Black-billed Turaco

Tauraco schuetti

French: Touraco à bec noir

German: Schwarzschnabelturako

Spanish: Turaco Piquinegro

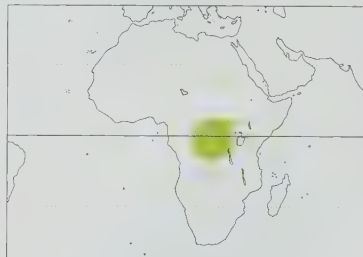
Taxonomy. *Corythaix Schüttii* Cabanis, 1879, Tala Magongo, Angola.

Member of the *T. persa* superspecies. Two additional localized forms (*sharpei* and *finschi*) described, but doubtfully valid, owing to much intergradation with *emini* and nominate *schuetti*. Two subspecies recognized.

Subspecies and Distribution.

T. s. emini (Reichenow, 1893) - S Sudan, E Zaire, Uganda and W Kenya to NW Tanzania, Burundi and Rwanda.

T. s. schuetti (Cabanis, 1879) - Zaire E to Ituri basin, S to Angolan border.



Descriptive notes. c. 40 cm; male 215-267 g, female 199-272 g. Adult very similar to *T. persa*, but with a small and almost all-black bill, and a more evenly rounded crest tipped with white. Mantle, rump, uppertail-coverts and folded wings violet-blue; lower breast to undertail-coverts dusky; white line in front of and under the eye separated by a thin black loreal patch; eyes hazel-brown; eyelids and orbital skin above and behind eye red; base of lower mandible dark red; legs and feet blackish. Immature similar to adult, but bill entirely black. Race *emini* has mantle, rump, uppertail-coverts and folded wings dark green; also

many blue intermediates between this and violet-blue nominate birds.

Habitat. Canopy of lowland, intermediate and montane evergreen forest, from 500 m to 2800 m.

Food and Feeding. Strictly frugivorous: particularly favours fruits of *Alangium*, *Ekebergia*, *Ficus*, *Ilex*, *Maesa*, *Mosanga*, *Olea*, *Olinia*, *Podocarpus*, *Polyscias*, *Prunus*, *Sapium* and *Syzygium*.

Breeding. Breeds Mar, May, Aug-Sept and Dec in Zaire; Feb and May in Uganda. Nest a frail platform of twigs some 3-5 m above ground in thick tangled secondary growth. Lays 2 white eggs; incubation by both sexes.

Movements. Largely sedentary throughout range.

Status and Conservation. Not globally threatened. CITES II. Plentiful throughout much of its range, particularly in Zaire, where its resonant "khaw, khaw, khaw..." call is one of the most characteristic year-round sounds of the forest.

Bibliography. Bannerman (1933), Britton (1980a), Cave & Macdonald (1955), Chapin (1939), Dowsett (1989, 1990), Dowsett & Dowsett-Lemaire (1993), Dowsett & Forbes-Watson (1993), Fry *et al.* (1988), Jackson & Selater (1938), Lewis & Pomeroy (1989), Lippens & Wille (1976), Mackworth-Praed & Grant (1957, 1970), Nikolaus (1987), Pinto (1983), Rutgers & Norris (1972), Short *et al.* (1990), Snow (1978), Sun & Moermond (1997), Zimmerman (1972), Zimmerman *et al.* (1996).

7. Fischer's Turaco

Tauraco fischeri

French: Touraco de Fischer

German: Fischerturako

Spanish: Turaco de Fischer

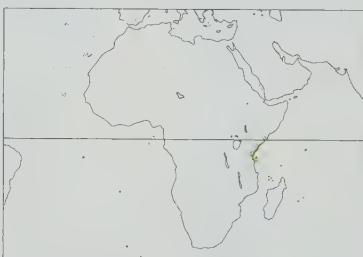
Taxonomy. *Corythaix Fischeri* Reichenow, 1878, Witu, Kenya.

A member of the *T. persa* superspecies. Two subspecies recognized.

Subspecies and Distribution.

T. f. fischeri (Reichenow, 1878) - S Somalia, coastal Kenya (inland along R Tana to Bura), and NE Tanzania from E Usambaras S to R Wami.

T. f. zanzibariensis Pakenham, 1938 - Zanzibar.



Descriptive notes. c. 40 cm; male 230-269 g, female 227-283 g. Unmistakable with white-tipped crimson crest, blackish at tallest point; nape also crimson; upperparts, including wings, rump and tail, greenish blue; lower belly blackish; primaries and inner secondaries crimson; white line from front of eye to bill separated from one under eye and extending to ear-coverts by small black loreal patch; eye brown, bare orbital skin red, surrounded by thin black ring; bill bright red; legs and feet blackish. Immature similar. Race *zanzibariensis* differs in having upperparts, wings, rump and tail violet-blue, not greenish blue.

Habitat. Forest and wooded thickets, favouring canopy and sub-canopy of mature fruiting trees. Sea-level to 1250 m, rarely 1450 m.

Food and Feeding. Primarily a fruit-eater: particular preference for the yellow berries of *Pachystela brevipes*. Also flower buds and young, pale green leaf shoots of *Azela cuanensis*. Occasionally eats insects which it encounters opportunistically while foraging.

Breeding. Breeds Jun in Kenya. Nest a frail platform of twigs placed 3-10 m above ground in thick tree foliage. Lays 2 almost spherical off-white eggs; incubation 22-23 days, by both sexes. Newly hatched young are covered in dark brown down, and as early as 10 days are hopping and crawling among nearby branches.

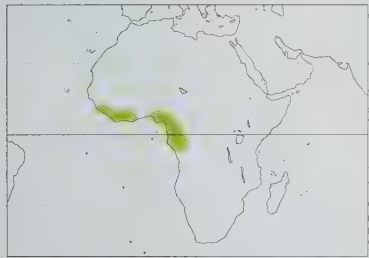
Movements. Largely sedentary in all areas.
Status and Conservation. Not globally threatened. CITES II. Currently considered near-threatened. Both races seriously affected by trapping and continuing clearance of coastal forests. The world population probably numbers no more than 2000 individuals, and the conservation status of this turaco may require re-evaluation. The population is small and endangered in S Somalia, where the species is restricted to the lower Juba Valley, while in Kenya and NE Tanzania it is common only in the Shimba Hills National Park and the E Usambara lowland forests. Race *zanzibarius* restricted to Zanzibar, where total population probably under 50 pairs.
Bibliography. Ash & Miskell (1983), Britton (1980a), Britton & Britton (1976), Britton & Zimmerman (1979), Dowsett & Dowsett-Lemaire (1993), Dowsett & Forbes-Watson (1993), Fry *et al.* (1988), Jackson & Selater (1938), King (1978/79), Lewis & Pomeroy (1989), Mackworth-Praed & Grant (1957), Milne (1991), Pakenham (1938, 1979), Paterson (1993), Short *et al.* (1990), Snow (1978), Zimmerman *et al.* (1996).

8. Yellow-billed Turaco

Tauraco macrorhynchus

French: Touraco à gros bec **German:** Blaurückenturako **Spanish:** Turaco Piquigualdo
Other common names: Black-tipped Crested/Verreaux's Turaco

Taxonomy. *Corythaix macrorhynchus* Fraser, 1839, Sierra Leone. Two subspecies recognized.
Subspecies and Distribution.
T. m. macrorhynchus (Fraser, 1839) - Sierra Leone E to Ghana.
T. m. verreauxii (Schlegel, 1854) - Nigeria, Cameroon and Bioko (Fernando Póo) S to Gabon, SW Congo, W Zaire and N Angola (Cabinda).



Descriptive notes. 40-43 cm; male 261-272 g, female 216-234 g. Head, neck and breast green; rounded helmet-like crest green, tipped black and white; wing-coverts, inner secondaries, scapulars, mantle, rump and tail glossy violet-blue; primaries and outer secondaries crimson; belly blackish, washed with green, undertail-coverts black; small velvety black patch below lores extends back in very thin black line, while under it a broader white one extends from gape to ear-coverts; eye dark brown, with bright red wattled orbital ring surrounded by thin black line; large bill bright yellow usually with dark red base; legs and feet black. Immature

duller. Race *verreauxii* has crest tipped crimson and black, not black and white, and violet-blue of upperparts heavily washed with green.

Habitat. Lowland and montane gallery forest; largely restricted to primary forest, only rarely wandering into secondary growth. Sea-level to 1600 m.

Food and Feeding. Primarily a fruit-eater, particularly favouring *Musanga*, *Coelocaryon*, *Polyalthia*, *Cissus*, *Heisteria*, *Maesopsis*, *Pachypodanthium*, *Trichilia*, *Uapaca*, *Macaranga*, *Trichoscapha*, *Ficus*, *Hugonia* and *Dacryodes*. Also eats tree seeds and shoots, as well as snails and insects flushed by swarms of army ants.

Breeding. Dec and Feb in Sierra Leone; Jun-Aug and Dec-Jan in Cameroon; and May-Jun, Aug and Dec-Jan in Gabon. Nest a flimsy platform of dry twigs, well hidden in tree foliage, 7-10 m above ground; reports of ground nesting on Bioko require confirmation. Lays 2 oval, creamy-white eggs; incubation by both sexes.

Movements. Sedentary in all areas.
Status and Conservation. Not globally threatened. CITES II. Reported to be not uncommon, or even common, in primary forest at Mt Nimba in Liberia, around Makokou in Gabon, and in suitable habitat in Sierra Leone, but few data on actual numbers. Elsewhere appears to be uncommon, although it may be overlooked or perhaps confused with similar species. The fact that it seems to be restricted largely to primary forest could make it especially vulnerable to further deforestation and localized tree-felling.

Bibliography. Bannerman (1933, 1953), Brosset & Énard (1986), Chapin (1939), Colston & Curry-Lindahl (1986), Decoux & Énard (1992), Dowsett (1989), Dowsett & Dowsett-Lemaire (1991), Dowsett & Forbes-Watson (1993), Dutson & Branscombe (1990), Elgood *et al.* (1994), Fry *et al.* (1988), Green (1990), Grimes (1987), Halleux (1994), Lippens & Wille (1976), Louette (1981), Mackworth-Praed & Grant (1970), Pérez del Val (1996), Pinto (1983), Rutgers & Norris (1972), Snow (1978), Thiollay (1985).

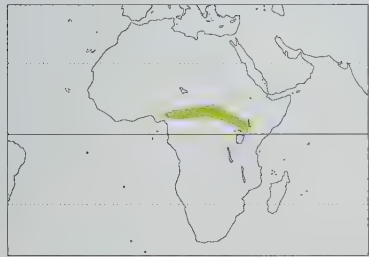
9. White-crested Turaco

Tauraco leucolophus

French: Touraco à huppe blanche **German:** Weißhaubenturako **Spanish:** Turaco Crestiblanco

Taxonomy. *Corythaix leucolophus* Heuglin, 1855, Bahr el Abiad, upper White Nile, southern Sudan. Monotypic.

Distribution. Extreme SE Nigeria, N Cameroon (Adamawa Plateau) E across S Chad and N Central African Republic to SW & S Sudan, NE Zaire, N & C Uganda and W Kenya.



Descriptive notes. c. 40 cm; male 200-225 g, female 198-226 g. Unmistakable, with pure white crest, cheeks and neck contrasting sharply with glossy violaceous blue-black lores, forehead, forecrown and area behind eyes; narrow line under eye black; throat pale greenish; mantle and breast grass-green, lower back, folded wings, rump and tail glossy violet-blue; belly and undertail-coverts blackish; primaries and outer secondaries crimson with blackish tips; eye dark brown, eyelid and bare orbital skin scarlet; bill yellow, pale greenish at base; legs and feet dark brownish black. Immature similar to adult.

Habitat. Riverine gallery forest and wooded savannas, particularly where there is an abundance of creepers and hanging foliage. Occurs from 100 m up to 2200 m.

Food and Feeding. Primarily fruits and berries, but also flowerheads, and some snails.
Breeding. Breeds Aug in Nigeria, May in Central African Republic, Apr onwards in Zaire, May-Jun in Uganda. Nest a flimsy saucer-shaped platform of intertwined dry sticks and twigs some 3-7 m above ground, often in quite open acacia-like tree. Lays 2 dull white, rounded eggs; incubation 22-23 days, by both sexes.

Movements. Although largely sedentary throughout its range, it will frequently venture away from the thicker gallery forest into the adjacent savannas, particularly when certain trees are in fruit.

Status and Conservation. Not globally threatened. CITES II. Fairly common in the Upper Nile regions of N Uganda and S Sudan, and locally common in W Kenya.

Bibliography. Bannerman (1933, 1953), Britton (1980a), Cave & Macdonald (1955), Chapin (1939), Dowsett & Forbes-Watson (1993), Elgood *et al.* (1994), Fry *et al.* (1988), Green (1990), Jackson & Selater (1938), Lewis & Pomeroy (1989), Lippens & Wille (1976), Louette (1981), Mackworth-Praed & Grant (1957, 1970), Nikolaus (1987), Rutgers & Norris (1972), Short *et al.* (1990), Snow (1978), Zimmerman *et al.* (1996).

10. Bannerman's Turaco

Tauraco bannermani

French: Touraco doré **German:** Bannermanturako **Spanish:** Turaco de Bannerman

Taxonomy. *Proturacus bannermani* Bates, 1923, Bango Mountains, north of Kumbo, Cameroon. Forms a superspecies with *T. erythrolophus*. Monotypic.
Distribution. Bamenda-Bango Highlands of NW Cameroon.



Descriptive notes. c. 43 cm; 200-250 g. Adult has grey lores, chin and cheeks; forehead dark grey with crimson wash; crown, crest and nape crimson (feather bases greenish grey); sides of neck and breast green; mantle, lower back, wing-coverts and tertials golden-green; rump blackish, glossed with green; uppertail-coverts and tail glossy purplish blue, outer edges of rectrices green; primaries and outer 3 secondaries crimson with dark brown tips; belly and undertail-coverts black with greenish wash; heavy, powerful bill yellow with dark red culmen and exposed nostrils; eyes hazel-brown, eyelids red; legs and feet black.

Habitat. Canopy and middle stratum of montane forest. Reported to be able to survive in damaged secondary forest, provided sufficient tall fruiting trees remain. From 1700 m to 2950 m.

Food and Feeding. Primarily fruits and berries of *Podocarpus milanjensis*; also figs.

Breeding. Breeds Mar-Jun, in early rainy season. Nest a flimsy platform of twigs, well hidden in thickest part of an isolated tree or bush, among a tangle of creepers, or in the thick foliage on outer branches, at 1.5-10 m above ground in open forest or along forest edge. Usually 2 white eggs; incubation by both sexes, starting soon after first egg laid.

Movements. Sedentary throughout range.
Status and Conservation. VULNERABLE. CITES I. Although not yet considered globally endangered, this is a vulnerable species and one of the most threatened birds in Africa. Currently under very severe threat from forest clearance, with its habitat reduced by half in the period 1965-1985, and is likely to survive only if the remaining forests on Mt Oku and Mt Ijim are safeguarded. Intensive conservation work is now being directed towards this area by BirdLife International and its Mt Kilum Forest Project.

Bibliography. Bannerman (1933, 1953), Bannerman & Bates (1924), Bates (1923, 1927), Collar & Andrew (1988), Collar & Stuart (1985), Collar *et al.* (1994), Dowsett & Forbes-Watson (1993), Eizenraut (1973), van den Elzen (1975), Ferguson-Lees & Faull (1992), Fotso (1993, 1996), Fry *et al.* (1988), Louette (1981), Mackworth-Praed & Grant (1970), Macleod & Parrott (1991, 1992), Serle (1950b), Snow (1978), Stuart & Jensen (1986), Young, J. (1995).

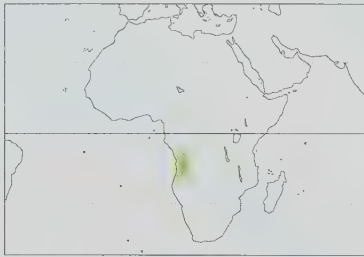
11. Red-crested Turaco

Tauraco erythrolophus

French: Touraco pauline **German:** Rotschopfturako **Spanish:** Turaco Crestirrojo

Taxonomy. *Opaethus erythrolophus* Vieillot, 1819, Angola. Forms a superspecies with *T. bannermani*. Monotypic.

Distribution. W & C Angola from lower R Congo S to Chingoroi area, and E to at least Malanje and upper R Cuanza. Sympatric with *T. schalowi* in many areas.



Descriptive notes. c. 40-43 cm; 210-325 g. Differs from *T. bannermani* only in having some of crimson crest feathers white-tipped, and more extended crimson on back of neck; lores, chin and cheeks white; bill smaller and all-yellow, with pale greenish at base in some birds; nostrils round, not oval, and covered by feathers.

Habitat. Evergreen and riverine gallery forests from R Congo in W of range, and extending E to Bie Province in the *Brachystegia* zone; also reported in ecotone between forest and *Brachystegia* woodland near N'dalatando.

Food and Feeding. Virtually unknown. Crop of one specimen from Chingoroi contained

seeds of Rubiaceae. Species presumably also takes fruits and berries.

Breeding. Undescribed.
Movements. Unknown. Presumably sedentary within its known range and habitat.

Status and Conservation. Not globally threatened. CITES II. A very little-known species, reportedly common in forest at Gabela and in N'dalatando district, and in gallery forest along the R Cuanza and in Quissama National Park. Endemic to war-torn Angola, where clearance of submontane forests on Angola Escarpment and continuing degradation of broadleaf woodlands present a possible threat to its numbers.

Bibliography. Arena (1982), Bannerman (1933, 1953), Dowsett & Forbes-Watson (1993), Fry *et al.* (1988), Hall (1960), Mackworth-Praed & Grant (1962, 1970), Meise (1955), Pinto (1983), Rutgers & Norris (1972), Snow (1978), Traylor (1963).



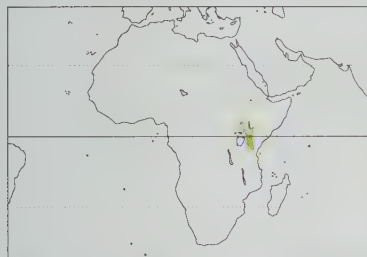
12. Hartlaub's Turaco

Tauraco hartlaubi

French: Touraco de Hartlaub **German:** Seidenturako **Spanish:** Turaco de Hartlaub
Other common names: Black-crested Turaco

Taxonomy. *Corythaix hartlaubi* Fischer and Reichenow, 1884, Mt Meru, northern Tanzania. Forms a superspecies with *T. leucotis*. Monotypic.

Distribution. Centred around Kenyan Highlands, extending into E Uganda at Mts Morongole, Moroto, Kadam, Debasien and Elgon, and into N Tanzania at Loliendo, Longido, Mt Meru and Mt Kilimanjaro, North and South Pares and W Usambaras.



Descriptive notes. 43 cm; male 210-270 g, female 195-275 g. Adult has forehead, rounded bushy crest and nape glossy blue-black, with a prominent white patch in front of eye, itself separated from a white line extending from gape to ear-coverts by a black loreal patch and a narrow black line immediately beneath eye; chin, cheeks, neck, mantle, throat and breast green; lower back, folded wings and tail deep violet-blue; rump blue-black; greater part of primaries and outer secondaries crimson; thighs and belly dull blackish, washed with green; eyes brown; orbital ring and bare skin behind eye red; bill dark red; legs and feet black. Immature similar to adult.

immature similar to adult.

Habitat. Montane evergreen forest at 1500-3200 m; in C Kenya, also occurs in well-timbered suburban gardens around Nairobi and Nanyuki.

Food and Feeding. Primarily fruits and berries, particularly *Chaetacme*, *Elaeodendron*, *Euclea*, *Trema*, *Duranta*, *Rawsonia*, *Podocarpus*, *Teclea*, *Viola* and *Olinea*; also eats the large, poisonous fruits of *Acokanthera longiflora*. In Nairobi suburbs frequently feeds on exotic fruits such as *Cotoneaster*, while at other times will also take caterpillars, moths and beetles.

Breeding. Breeds Apr-Dec, with peaks coinciding with periods of high rainfall. Nest a shallow platform of loosely interlaced twigs, sometimes lined with finer twigs, some 3-8 m above ground among thick tree foliage. Usually 2 round ovate, dull white eggs; incubation 16-18 days, by both sexes. Newly hatched chicks are covered in black down, and are fed on caterpillars and regurgitated fruit pulp; at 17-18 days able to climb all over the nest tree, rarely lingering in the nest itself, and can fly at c. 28 days. Initial nests commonly fail, and pairs soon nest again.

Movements. Sedentary throughout its range.

Status and Conservation. Not globally threatened. CITES II. Fairly common everywhere within its range, and still found to be locally abundant in many areas above 2000 m. Some populations in N Tanzania appear to have suffered a significant impact as a consequence of indiscriminate trapping for the bird-export trade.

Bibliography. Bennun & Njoroge (1996), Britton (1980a), Brown & Britton (1980), Dowsett & Forbes-Watson (1993), Friedmann (1930a), Fry *et al.* (1988), Jackson, C. (1997), Jackson, F.J. & Sclater (1938), Lewis & Pomeroy (1989), Mackworth-Praed & Grant (1957), Rutgers & Norris (1972), Short *et al.* (1990), Snow (1978), van Someren (1956), Zimmerman *et al.* (1996).

13. White-cheeked Turaco

Tauraco leucotis

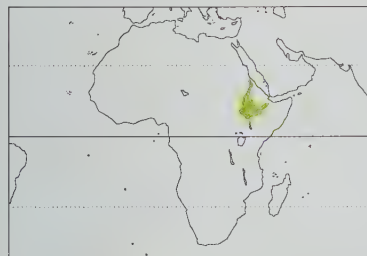
French: Touraco à joues blanches **German:** Weißohrturako **Spanish:** Turaco Cariblanco

Taxonomy. *Corythaix leucotis* Rüppell, 1835, northern Ethiopia. Forms a superspecies with *T. hartlaubi*. Two subspecies recognized.

Subspecies and Distribution.

T. l. leucotis (Rüppell, 1835) - Ethiopian Highlands from SW Arussi, Shoa and Sidamo Provinces, W to the Boma Plateau in SE Sudan, and N to Eritrea.

T. l. donaldsoni (Sharpe, 1895) - SC Ethiopian Highlands in N Harrar, Arussi and N Bale.



Descriptive notes. 42-43 cm; 200-315 g. Adult has forehead, neck, throat, breast and upperparts green; rounded crest and hindcrown glossy dark blue, with a large circular white loreal patch, a small black band (often very faint) extending under eye from gape to ear-coverts, and a prominent but variable crescentic white patch on side of neck; lower back, folded wings and tail greyish blue, rump grey-blue; primaries and outer secondaries crimson; thighs and belly dull blackish; eye brown, with bright red wattled orbital ring; bill red, with greenish base around nostrils largely concealed by feathers; legs and feet black. Immature rather similar to adult. Race *donaldsoni* has hindcrown and crest dull crimson. Nominate birds in Eritrea and areas W of the Rift Valley have upper back and wing-coverts bluer, and they also have large conspicuous neck patches, while many birds E of the Rift are brighter and greener, with less white on sides of neck.

Habitat. Typically occurs in montane *Podocarpus* and juniper (*Juniperus*) forest from 2200 m up to 3200 m, but can be found as low as 850 m in the Omo Valley; also in tall gallery trees and thick bush along watercourses. In Eritrea occurs in almost any type of dense woodland, except acacia, ranging down to 900 m.

Food and Feeding. Primarily fruits and berries of *Podocarpus* and juniper trees.

Breeding. Breeds in Apr in Eritrea, and in Jun-Nov in Ethiopia. Nest is a rather thick platform of dry twigs, very loosely constructed, with a slight depression at top, placed some 7-10 m above ground. Lays 2 off-white eggs; incubation 22-23 days, by both sexes. Newly hatched chicks are covered in black down; at 18-19 days they begin to crawl about in branches around nest, and are able to fly at 25-26 days.

Movements. Largely sedentary throughout its range.

Status and Conservation. Not globally threatened. CITES II. Fairly common in many areas of *Podocarpus* and juniper forest in Ethiopian Highlands above 2400 m. No known threats at present, but any destruction of this species' forest habitats could lead to serious local depletion of its numbers.

Bibliography. Borghesio (1997b), Cave & Macdonald (1955), Cheesman & Sclater (1935), Deshayes (1975), Dowsett & Forbes-Watson (1993), Duckworth *et al.* (1992), Énard & Prévost (1971), Evans (1984), Everitt (1965), Foxall & Burton (1975), Friedmann (1930a), Fry *et al.* (1988), Hewston (1984), Mackworth-Praed & Grant (1957), Martin (1973), Moltoni (1939), Nikolaus (1987), Rutgers & Norris (1972), Smith (1957), Snow (1978), Urban & Brown (1971), Wilson (1985).

14. Ruspoli's Turaco

Tauraco ruspolii

French: Touraco de Ruspoli **German:** Ruspoliturako **Spanish:** Turaco de Ruspoli
Other common names: Prince Ruspoli's Turaco

Taxonomy. *Turacus ruspolii* Salvadori, 1896, southern Ethiopia (? Arero). Monotypic.

Distribution. Restricted to S Ethiopia around Arero, Bobela, Sokora, Neghelli and Wadera.



Descriptive notes. c. 40 cm; 200-290 g. Adult has forehead and front of crest covering nostrils greenish grey; rest of rounded bushy crest (feathers 40 mm long) is greyish white, rose-pink at base, and with a tuft of red feathers on nape; lores, area under eye, and ear-coverts bright yellowish green; chin and throat greyish green; neck, breast and upper back moss-green; lower back, folded wings and tail greyish blue; primaries and outer secondaries crimson; belly and thighs blackish; eye brown, with bare orbital skin and wattle above eye vermilion-red; bill vermilion-red; legs and feet black. Juvenile undescribed.

Habitat. While occurring in juniper (*Juniperus*) forest with dense evergreen undergrowth near Arero and Wadera, it is thought to favour drier forest margins, acacia-conifer woodland, and mixed broadleaf scrub with scattered *Gardenia* and *Ficus*. From 1250 m to 1860 m.

Food and Feeding. Primarily fruit, with figs (*Ficus*), *Juniperus procera* and *Podocarpus gracilior* as main food plants.

Breeding. No definite information available. Recently reported by local people to breed Dec-Feb near Genale R (Sidamo Province); investigation required.

Movements. Believed to undertake regular short-range movements from wetter juniper forests and their margins to surrounding drier woodland.

Status and Conservation. ENDANGERED. CITES II. Although listed as being a globally Endangered species, with its survival threatened by continuing degradation and loss of habitat within its restricted range, recent surveys suggest that it is actually much more common and widespread than was believed until quite recently. Field work has also shown that it prefers drier habitats such as acacia-conifer woodland, rather than the wetter juniper forests, and that it can tolerate human presence and activities within its habitat.

Bibliography. Ash & Gullick (1989), Benson (1942, 1945), Borghesio (1997a, 1997b), Coles & Woolham (1996), Collar & Andrew (1988), Collar & Stuart (1985), Collar *et al.* (1994), Dellelegn (1991), Dowsett & Forbes-Watson (1993), Énard & Prévost (1970), Fishpool *et al.* (1996), Fry *et al.* (1988), Gilbert (1971), Hall & Moreau (1962), Mackworth-Praed & Grant (1957), Robertson (1995, 1996), Salvadori (1913), Shuker (1993), Snow (1978), Sørensen *et al.* (1997), Syvertsen & Dellelegn (1991), Urban (1980), Urban & Brown (1971).

15. Purple-crested Turaco

Tauraco porphyreolophus

French: Touraco à huppe splendide **German:** Glanzhaubenturako **Spanish:** Turaco Crestimorado
Other common names: Violet-crested Turaco, Purple-crested Lourie

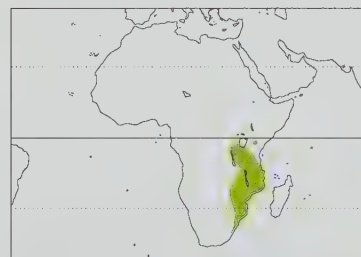
Taxonomy. *Corythaix porphyreolophus* Vigors, 1831, Durban.

Placed in the genus *Musophaga* by some authorities; formerly awarded monotypic genus *Gallirex*. Races intergrade in Zambezi Valley. Two subspecies recognized.

Subspecies and Distribution.

T. p. chlorochlamys (Shelley, 1881) - SE Kenya through Tanzania, Burundi and Rwanda to Zambia (Victoria Falls, Luano and Luangwa Valleys), Malawi and N Mozambique.

T. p. porphyreolophus (Vigors, 1831) - Zimbabwe and Mozambique S to E Transvaal and Natal.



Descriptive notes. 42-46 cm; male 225-303 g, female 218-328 g. Adult has forehead, supercilary area, cheeks and ear-coverts glossy emerald-green; rounded crown, crest and nape iridescent dark violet-purple; lower cheeks, chin, throat and neck green; upper back and breast green, washed with rose-pink; lower back, and wing-coverts (except lesser) greyish blue; rump dull blue-black; uppertail-coverts, tail and inner secondaries glossy violet-blue with greenish wash; primaries and outer secondaries crimson with dark brownish edges and tips; belly and thighs pale bluish slate; eyes brown, with bare orbital skin scarlet; bill black; legs and feet blackish. Juvenile similar to adult, but crimson in wings duller and less extensive. Race *chlorochlamys* lacks pink wash to upper back and breast; bare scarlet skin around eye typically extends farther forward; belly and thighs dull greenish grey; secondaries and tail lack greenish tones.

On following pages: 16. Ruwenzori Turaco (*Ruwenzorornis johnstoni*); 17. Violet Turaco (*Musophaga violacea*); 18. Ross's Turaco (*Musophaga rossae*); 19. Grey Go-away-bird (*Corythaixoides concolor*); 20. Bare-faced Go-away-bird (*Corythaixoides personatus*); 21. White-bellied Go-away-bird (*Corythaixoides leucogaster*); 22. Western Grey Plantain-eater (*Crinifer piscator*); 23. Eastern Grey Plantain-eater (*Crinifer zonurus*).

Habitat. Typically in moist woodland, evergreen thickets and riparian growth, but also frequents coastal forest, *Brachystegia* woodland and, in some areas, suburban parks, gardens and exotic plantations. Occurs from sea-level up to 1850 m.

Food and Feeding. Frugivorous. Favourite fruits include *Ficus sycamorus*, *Ficus soldanella*, *Strychnos decussata*, *Strychnos potatorum*, *Lannea stuhlmanni* and *Berchemia discolor*; also takes *Ekebergia*, *Vitex*, *Syzygium*, *Diospyros*, *Maesa*, *Rhus*, *Crocoxylon*, *Duranta*, *Feretia*, *Pseudocadia*, *Olea*, *Celtis*, *Mimusops*, *Ziziphus*, *Rhoicissus*, *Antidesma*, *Chaetacme* and *Cassine*, as well as several other species of *Ficus*, and buds of *Capparis*. In southern Africa, readily feeds at birdtables on paw-paw, guava, mulberries and maize-meal. In captivity, has been recorded consuming 134 g of food daily.

Breeding. Breeds Jan-Mar in Tanzania, Jan in Malawi, Dec in Zambia, Oct-Jan in Zimbabwe, Nov-Dec in S Africa. Nest a flimsy unlined platform of interlacing twigs 3-9 m above ground, well concealed in a tree among matted creepers or dense parasitic growth, often in isolated thicket or at edge of forest. Lays 2-3 rounded, glossy white eggs, laying interval 1-2 days; incubation 22-23 days, by both sexes. On hatching, young are covered with thick greyish brown down; brooded almost continuously for the first week, fed by both parents by regurgitation, parents swallowing chicks' faeces immediately they appear; chicks become active at c. 3 weeks, moving out of nest to climb about in nest tree, and make first flight at c. 38 days.

Movements. Limited movements appear to occur, as birds are often liable to turn up at fruiting trees in areas from which they are usually absent; however, precise patterns unclear. Also, in association with the rains, there may be some seasonal dispersal away from riparian growth and into surrounding woodland or thornbush.

Status and Conservation. Not globally threatened, CITES II. An essentially resident species which, although localized, is quite common in several parts of its southern African range. Owing to severe loss of habitat and indiscriminate trapping in Tanzania, however, subspecies *chlorochlamys* has become a near-threatened taxon within its E African range, where only a few small isolated groups now survive.

Bibliography. Benson & Benson (1977), Benson *et al.* (1971), Britton (1980a), Clancey (1996), Dowsett & Dowsett-Lemaire (1993), Dowsett & Forbes-Watson (1993), Fry *et al.* (1988), Ginn *et al.* (1989), Jackson & Selater (1938), Jarvis & Currie (1979), Lewis & Pomeroy (1989), Mackworth-Præd & Grant (1957, 1962), Maclean (1993), Newman (1996), Raison (1992), Rowan (1983), Rutgers & Norris (1972), Short *et al.* (1990), Sinclair (1987), Sinclair & Whyte (1991), Snow (1978), Wood, J. (1992), Zimmerman *et al.* (1996).

Genus *RUWENZORORNIS* Neumann, 1903

16. Ruwenzori Turaco

Ruwenzorornis johnstoni

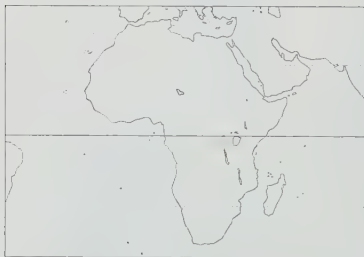
French: Touraco du Ruwenzori **German:** Kammschnabelturako **Spanish:** Turaco del Ruwenzori
Other common names: Johnston's Turaco

Taxonomy. *Gallirex johnstoni* Sharpe, 1901, Mt Ruwenzori. Placed in the genus *Musophaga* by some authorities. Proposed race *bredoi*, originally described from W shore of L Tanganyika, is now considered synonymous with nominate. Two subspecies recognized.

Subspecies and Distribution.

R. j. johnstoni (Sharpe, 1901) - Ruwenzori Mts in NE Zaire and SW Uganda; also E Zaire at Mulu (NW of L Edward), and at Mt Kabobo (at NC part of W shore of L Tanganyika).

R. j. kivuensis Neumann, 1908 - montane forests of Kivu Highlands of E Zaire, Virunga volcanoes and Nyungwe Forest of Rwanda and Burundi, and SW Uganda (Bwindi National Park).



Descriptive notes. c. 45 cm; 211-259 g. Adult has forehead and forecrown glossy emerald-green; hindcrown with short crest glossy purplish blue or emerald-green (varying with light direction); nape dull crimson; chin and throat glossy dark violet (usually appearing black), sharply demarcated from green cheeks and neck; upper back and breast green, with peachy-red patch on foreneck and breast; lower back, wing-coverts and tail deep violet-blue, shading to black on rump; primaries and outer secondaries crimson with dark tips; belly, thighs and undertail-coverts grey; bill pale grey-green often with bluish wash and base

finely stippled purplish red, nostrils to tip black; shape distinctive, with high, almost straight culmen rising to narrow bony ridge between eyes; eye dark brown, with narrow red eyelids; large bare patch behind, under and in front of eye is mostly bright lemon-yellow, but scarlet at rear and lower edge in some individuals; legs and feet blackish. Immature undescribed. Race *kivuensis* lacks bare facial patch, having this area fully feathered bright emerald-green.

Habitat. Montane forests, generally favouring those areas dominated by bamboo and *Podocarpus*. From 2000 m to 3600 m.

Food and Feeding. Fruits and berries, notably those of *Ficus*, *Galiniera*, *Maesa*, *Musanga*, *Olea*, *Olinia*, *Podocarpus latifolius*, *Polyscias*, *Prunus*, *Rapanea*, *Rutidea*, *Schefflera* and *Syzygium*. Also takes insects, snails, slugs and leaves of lianas and epiphytes.

Breeding. Breeds May in Uganda, May-Nov in E Zaire, Oct-Nov in Rwanda. Nest a small platform of sticks, much like that of a pigeon (Columbidae), some 3-5 m above ground, often in a clump of bamboo. Lays 1-2 dull greyish white eggs; incubation by both sexes. Young bird is covered in blackish down, with bare skin around eyes bluish, but pinkish around ear-coverts; bill blackish at tip, pinkish basally; legs greyish.

Movements. Sedentary throughout its range.

Status and Conservation. Not globally threatened. Although confined to the montane forests of the Albertine Rift, this distinctive species appears to be fairly common throughout its rather restricted range.

Bibliography. Britton (1980a), Chapin, J.P. (1939), Chapin, R.T. (1978), Dowsett (1990), Dowsett & Dowsett-Lemaire (1993), Dowsett & Forbes-Watson (1993), Fry *et al.* (1988), Jackson & Selater (1938), Lippens & Wille (1976), Mackworth-Præd & Grant (1957, 1970), Prigogine (1960), Rutgers & Norris (1972), Short *et al.* (1990), Snow (1978), Sun & Moermond (1997).

Genus *MUSOPHAGA* Isert, 1789

17. Violet Turaco

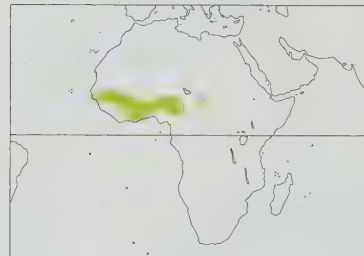
Musophaga violacea

French: Touraco violet **German:** Schildturako **Spanish:** Turaco Violáceo
Other common names: Violet Plantain-eater

Taxonomy. *Musophaga violacea* Isert, 1789, Accra, Ghana.

Forms a superspecies with *M. rossae*. Birds from E end of range formerly awarded separate race, *savannicola*. Monotypic.

Distribution. S Senegambia and Guinea E to N Nigeria and NW Cameroon, extending S to the coast in Ivory Coast, Ghana and Togo, but not in Sierra Leone, Liberia or Nigeria; also an apparently isolated population in extreme S Chad and N Central African Republic.



Descriptive notes. c. 50 cm; c. 360 g. Adult has crown and nape crimson, the feathers short and velvety; ear-coverts silky white; chin, throat and neck glossy violaceous blue-black; upperparts and wing-coverts violet-blue; tail violet-blue, washed with green; breast to upper belly violaceous blue-black, strongly washed with moss-green; lower belly and thighs matt black; primaries and outer secondaries crimson, tipped brown; bill red, with convex yellow frontal shield or casque extending back on forehead to a point level with rear edge of eyes; eyes dark brown, with bare orbital ring red; bare loreal patch and area around eye bright red; legs and feet

black or greenish black. Juvenile rather "crow-like", lacking conspicuous head and bill colours of adult: bill blackish with swollen base but without frontal shield, lores and small area under eyes naked and dark, rest of head matt black, with remainder of body plumage similar to adult.

Habitat. Typically in gallery forest, forest edge and fringing forests along watercourses in mesic or arid savannas; also occasionally in tall, well-timbered suburban parks and gardens. Sea-level to 1000 m.

Food and Feeding. Primarily fruits, berries and seeds, with figs (*Ficus*) favoured at all times.

Breeding. Breeds in Apr in Senegambia, Jun-Oct in Nigeria. Nest a fragile pigeon-type platform of sticks and twigs, some 6 m above ground in a leafy tree. Lays 2 oval, greyish white eggs, not glossy; incubation 25-26 days, by both sexes.

Movements. Very little precise information available. Species is probably sedentary, or at least mainly so; however, it appears to be vagrant to Sierra Leone, where only two records, one of them from 19th century.

Status and Conservation. Not globally threatened. Locally common in several areas, and possibly even very common in some places, but no detailed data on numbers. Populations in Guinea, Sierra Leone, Liberia and Ghana are heavily impacted by indiscriminate trapping for bird-export trade. CITES III in Ghana.

Bibliography. Bannerman (1933, 1953), Bent (1988), Bent & Corbett (1993), Cheke & Walsh (1996), Dowsett & Forbes-Watson (1993), Elgood *et al.* (1994), Fry *et al.* (1988), Giraudeau *et al.* (1988), Gore (1990), Green (1990), Grimes (1987), Jensen & Kirkeby (1980), Lamarche (1980), Louette (1981), Mackworth-Præd & Grant (1970), Malbrant (1952), Morel & Morel (1990), Rutgers & Norris (1972), Snow (1978), Thiollay (1985), Wells & Walsh (1969).

18. Ross's Turaco

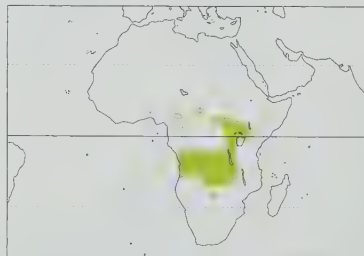
Musophaga rossae

French: Touraco de Lady Ross **German:** Rossturako **Spanish:** Turaco de Ross
Other common names: Ross's Lourie, Lady Ross's Violet Plantain-eater/Turaco

Taxonomy. *Musophaga Rossae* Gould, 1852, Angola.

Forms a superspecies with *M. violacea*. Monotypic.

Distribution. Widely distributed from NE & E Zaire, S Sudan, Uganda, W Kenya, NW Tanzania, Rwanda and Burundi to all of S Zaire, N & E Angola and N Zambia; also isolated populations in NE Gabon, Cameroon, N Central African Republic, and at one or two localities in the Caprivi Strip and in the Okavango Delta in NW Botswana. May be sympatric with *M. violacea* in N Central African Republic and near Galim in C Cameroon.



Descriptive notes. 51-54 cm; male 390-444 g, female 395-398 g. Adult has crown dark crimson, with feathers forming a short, erectile crest; chin, throat, nape and neck glossy blue-black; upperparts, breast, wing-coverts and tail dark violaceous blue; belly and thighs blackish; primaries and outer secondaries crimson, tipped brown; bill yellow, with convex yellow frontal shield or casque extending back on forehead to a point level with front edge of eyes (lower mandible and hind part of casque occasionally reddish); eye brown; bare loreal skin and area above, below and behind eyes bright yellow; legs and feet black. Juvenile has

bill and bare skin around eyes blackish, yellow culmen but no frontal shield, forehead feathering black, and crown black with red central patch.

Habitat. Canopy of evergreen gallery and riparian forest, but also in *Mavunda* forest and *Marquesia* thickets in Zambia, and in *Euphorbia* bush and on occasions deciduous thickets and *Brachystegia* woodland in Botswana and Caprivi Strip. Typically from sea-level to 1750 m, but also to 2500 m on border between S Sudan and NE Uganda.

Food and Feeding. Wild and cultivated fruits and berries, including *Ficus*, *Musanga*, *Bridelia*, *Beilschmiedia*, *Cissus* and guava; also flowers of *Grevillea*, young shoots, and termites and snails.

Breeding. Breeds May-Nov in W Kenya, all year round (except Sept) in Uganda, Sept-Nov in Zambia, and Dec in Zaire. Nest a pigeon-type platform of sticks up to 60 cm long, lined with

smaller twigs, and built by both sexes 2-16 m above ground among thick foliage, mistletoe or creepers, often in an isolated tree. Lays 1-2 almost cylindrical creamy-white eggs; incubation 24-26 days, by both sexes, changeovers occurring 3-4 times per day. Newly hatched young are covered in woolly, dark brown down; brooded for at least 8 days, when first quills begin to appear, and at 21 days are well feathered, though head is still mainly downy, while crest starts to develop at 23-30 days; leave nest around day 24, hopping about on nearby branches, before leaving the nest tree permanently at c. 26-31 days with parents in close attendance.

Movements. Frequently wanders to fruiting trees in areas away from its normal haunts. Otherwise more or less sedentary.

Status and Conservation. Not globally threatened. Common in Uganda, and reported as frequent to common in general throughout much of its range. The fact that this species' discovery in NE Gabon in mid 1980's occurred only after earlier intensive survey work in the area had failed to record it indicates that, like other members of the family, it may well be overlooked in some places. Occasional records of nests being raided by blue monkeys (*Cercopithecus mitis*) and by snakes such as the forest cobra (*Naja melanoleuca*), in W Kenya.

Bibliography. Bannerman (1953), Benson *et al.* (1971), Britton (1980a), Brown & Britton (1980), Cave & Macdonald (1955), Dowsett (1990), Dowsett & Forbes-Watson (1993), Fry *et al.* (1988), Ginn *et al.* (1989), Good (1952), Irwin (1984), Jackson & Selater (1938), Lewis & Pomeroy (1989), Lippens & Wille (1976), Louette (1981), Mackworth-Præd & Grant (1957, 1962, 1970), Maclean (1993), Nikolaus (1987), Paine & Tomeczak (1983), Pinto (1983), Rutgers & Norris (1972), Schouteden (1950), Short *et al.* (1990), Sinclair (1987), Snow (1978), Turner (1978), Zimmerman *et al.* (1996).

Subfamily CRINIFERINAE

Genus *CORYTHAIXOIDES* A. Smith, 1833

19. Grey Go-away-bird

Corythaixoides concolor

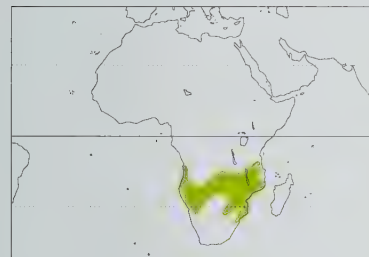
French: Touraco concolore **German:** Graulärmvögel **Spanish:** Turaco Unicolor
Other common names: Grey Lourie

Taxonomy. *Corythaix concolor* A. Smith, 1833, inland of Durban.

Forms a superspecies with *C. personatus*. Races *pallidiceps* and *bechuanae* intergrade in W Botswana. Two additional forms (*chobiensis* and *cuanhamae*) are considered doubtfully separable from *bechuanae*. Four subspecies currently recognized.

Subspecies and Distribution.

C. c. molybdophanes (Clancey, 1964) - NE Angola through S Zaire, Zambia and N Malawi to S Tanzania and adjacent areas of N Mozambique.
C. c. pallidiceps (Neumann, 1899) - W Angola S to Namibia, extending seasonally to W Botswana.
C. c. bechuanae (Roberts, 1932) - S & SE Angola and NE Namibia through Botswana and the Caprivi Strip to SW Zambia, the Zimbabwe Plateau, and N & W Transvaal.
C. c. concolor (A. Smith, 1833) - S Malawi and N Mozambique S to E Transvaal, E Swaziland and E Zululand.



Descriptive notes. 47-50 cm; male 221-299 g, female 202-305 g. Adult has entire head and body warm smoky-grey, palest around eyes and on belly, and darkest on chin, throat, remiges and primary coverts; tail darkens towards tip, which is dark brown; breast has a suffusion of greyish olive or olive-green, though generally this is barely noticeable in the field; feathers of crown are elongated and partly decomposed, forming a conspicuous and slightly shaggy crest 60-75 mm in length that can be raised or depressed at will; when flattened, it projects well beyond back of head; eye brown; bill, legs and feet black. Juvenile has a shorter crest and a buffy tinge to its plumage. Races differ only moderately: *pallidiceps* palest, with breast suffusion yellowish and more extensive; *molybdophanes* lacks olive suffusion on breast; *bechuanae* darkest, and generally has longest crest (to 75 mm).

Habitat. Typically in thornbush, savanna and riparian woodlands, generally showing a preference for woodlands dominated by or including acacias; frequently recorded in suburban parks and gardens. Highly dependent on water in all areas. Sea-level to 1500 m, but occasionally to 2200 m in E Zimbabwe.

Food and Feeding. Fruits of *Ficus*, *Viscum*, *Loranthus*, *Diospyros*, *Lannea*, *Ziziphus*, *Salvadora*, *Grewia*, *Euclea*, *Dovyalis*, *Bridelia*, *Pseudocadia*, *Strychnos*, *Coroneaster* and *Melia*; also a wide variety of cultivated fruits up to the size of a peach. Eats pods of *Acacia*; probes flowers for nectar, and eats whole flowers of *Aloe*, *Acacia robusta*, *Acacia karroo*, *Erythrina*, *Sclerocarya* and *Bauhinia*; also leaf buds and leaves of *Acacia robusta*, *Melia* and *Ficus capensis*. Frequently comes to ground to drink and to eat termites.

Breeding. Breeds Jul-Aug in Angola, Apr-Nov in Malawi, Aug-Sept in Zambia, Sept and Dec-Apr in Namibia, and all months in South Africa and Zimbabwe. Nest a flimsy, pigeon-type platform of sticks, c. 18-24 cm in diameter, built by both sexes 3-20 m (generally c. 5 m) above ground and usually in an acacia, but on occasions in non-thorny trees, clumps of mistletoe or among dense matted creepers in a tree. Usually 3 eggs (1-4), white or pale greyish blue and slightly glossy, laid at 2-day intervals; incubation 26-28 days, by both sexes, and generally by female only at night; hatching staggered, with last egg hatching between 18 hours and 3 days after first. Newly hatched young are covered in dense brown or greyish brown down; fed by regurgitation; become very active at 2-3 weeks, clambering awkwardly around branches near nest, and leaving it permanently on day 23; able to fly at c. 4 weeks, and still fed by parents up to 40-45 days, but independent of them at c. 7 weeks.

Movements. While there is much local wandering in relation to fluctuating food and water supplies, no regular migratory movements have been recorded.

Status and Conservation. Not globally threatened. Throughout much of its range this is a common species, often found in flocks of up to 30 at drinking and feeding sites, or perched near tops of tall

thorn trees. In parts of S Africa, it is considered a pest in fruit-growing areas and gardens and is consequently persecuted; large numbers were formerly killed for food, and this practice continues in certain places. Frequently a victim of birds of prey, especially Bateleur (*Terathopius ecaudatus*) and African Goshawk (*Accipiter tachiro*), but also preyed upon by other diurnal raptors.

Bibliography. Aarts (1983), Babich (1982), Benson & Benson (1977), Benson *et al.* (1971), Braine *et al.* (1983), Britton (1980a), Clancey (1964a, 1996), Dowsett & Forbes-Watson (1993), Fry *et al.* (1988), Ginn *et al.* (1989), Lippens & Wille (1976), Mackworth-Præd & Grant (1957, 1962, 1970), Maclean (1993), Newman (1996), Penry (1979a, 1994), Pinto (1983), Roles (1970), Rowan (1983), Rutgers & Norris (1972), Sinclair (1987), Sinclair & Whyte (1991), Snow (1978), Stevenson (1982), Young (1976).

20. Bare-faced Go-away-bird

Corythaixoides personatus

French: Touraco masqué **German:** Nacktkehl-Lärmvögel **Spanish:** Turaco Enmascarado
Other common names: Black-faced Lourie

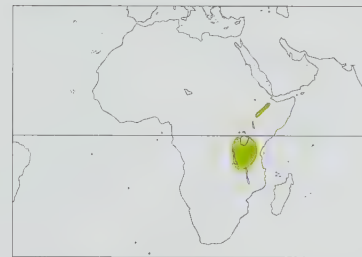
Taxonomy. *Chizærhis personata* Rüppell, 1842, Ethiopia.

Forms a superspecies with *C. concolor*. Two subspecies recognized.

Subspecies and Distribution.

C. p. personatus (Rüppell, 1842) - Ethiopian Rift Valley from Dire Dawa and Ankober S to I. Abaya and Yavello.

C. p. leopoldi (Shelley, 1881) - S Uganda, Rwanda, Burundi, SW Kenya and Tanzania S to N Malawi, NE Zambia and SE Zaire.



Descriptive notes. c. 48 cm; 210-300 g. Adult has forepart of face to behind eyes, and chin and upper throat virtually bare of feathers, appearing dark brown; forehead and rather lax crest ashy-brown washed with green, crest 60 mm long; breast pale sage-green, back, wings and tail smoky-grey with slightly scaled effect; upper belly dark pinkish brown, shading to greenish on undertail-coverts; underwing and undertail pale greenish; eye brown; bill, legs and feet black. Juvenile similar to adult, but plumage fluffy and downy, crest dark grey-brown, upperparts tinged brown, green on breast greatly reduced. Race *leopoldi* has bare

part of face black instead of brown; crest shorter (50 mm), paler ashy-brown; sides of neck and breast white, shading to ashy-white on nape and hindneck, centre of breast sage-green; upperparts, wings and tail pale grey; belly paler pinkish brown or pinkish puce, shading to greyish on undertail-coverts; underwing and undertail also pale grey.

Habitat. Open woodland, acacia thornbush, thickets, cultivation with scattered trees, and riverine acacias. From 500 m to 1850 m, occasionally to 2000 m.

Food and Feeding. Berries of *Grewia bicolor*, also buds and seed pods of *Acacia xanthophloea*.

Breeding. Breeds Mar in Ethiopia, May and Sept-Nov in S Uganda, May-Oct in Tanzania, and Oct in N Malawi. Nest a shallow platform of loosely interwoven sticks, sometimes lined with rootlets and dry grass, c. 5 m above ground in a fork or near the top of an acacia tree. Lays 2-3 round, glossy white eggs; incubation by both sexes.

Movements. Largely sedentary throughout its range.

Status and Conservation. Not globally threatened. No figures available, but species is locally common in SW Kenya and over much of Tanzania.

Bibliography. Benson & Benson (1977), Benson *et al.* (1971), Britton (1980a), Dowsett & Forbes-Watson (1993), Duckworth *et al.* (1992), Friedmann (1930a), Fry *et al.* (1988), Jackson & Selater (1938), Johnstone-Stewart & Heigham (1982), Lewis & Pomeroy (1989), Lippens & Wille (1976), Mackworth-Præd & Grant (1957, 1962, 1970), Newman *et al.* (1992), Short *et al.* (1990), Snow (1978), Urban & Brown (1971), Zimmerman *et al.* (1996).

21. White-bellied Go-away-bird

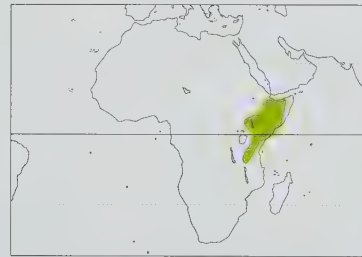
Corythaixoides leucogaster

French: Touraco à ventre blanc **German:** Weißbauch-Lärmvögel **Spanish:** Turaco Ventriblanco

Taxonomy. *Chizærhis leucogaster* Rüppell, 1842, southern Ethiopia.

Sometimes placed in the monospecific genus *Crimiferoides*. Monotypic.

Distribution. Restricted to acacia savannas in E & NE Africa: NW, C & S Somalia, Ethiopia (W to the Rift Valley), S Sudan, NE Uganda (Karamoja and Teso), N & E Kenya and S through the eastern plateau of Tanzania (W to Tabora, S to Ruaha National Park).



Descriptive notes. c. 50 cm (tail 24-25 cm); male 170-225 g, female 225-250 g. Adult grey, with white belly and undertail-coverts; a stiff, pointed, 60 mm-long brownish grey crest with dark brownish black tips rises from forehead; sides of head, chin and entire neck and breast grey, like upperparts; median and greater upwing-coverts with black ends forming partial bars on closed wing; white bases to black primaries form a conspicuous white patch in flight; tail black with broad white median band; bill blackish in male, pea-green in female (becoming yellowish when breeding); eye hazel-brown; legs and feet black. Juvenile similar to adult but browner, particularly on wing-coverts.

Habitat. Typically hot, low-lying acacia steppe and savanna with scattered trees. Occurs from sea-level up to 1700 m.

Food and Feeding. Fruits, flowers, seeds and buds of acacias, particularly favouring the young green pods of *Acacia tortilis*.

Breeding. Breeds Feb-Jul in Somalia and Ethiopia, Feb-Aug in Kenya and Tanzania, Jul-Aug in NE Uganda. Nest a rather small, frail flat structure of twigs, some 3-12 m above ground and generally in an acacia-type tree. Lays 2-3 oval, glossy, pale bluish eggs; incubation 27-28 days, by both sexes.

Movements. Largely sedentary throughout its range.

Status and Conservation. Not globally threatened. Generally common throughout its range. Although no real indication of population numbers available, observations indicate that species is

abundant in many areas. Possibly suffers some predation by birds of prey in the same way as do other birds in similar habitats, but no data have been published.

Bibliography. Ash & Miskell (1983), Britton (1980a), Brown & Britton (1980), Cave & Macdonald (1955), Dowsett & Dowsett-Lemaire (1993), Dowsett & Forbes-Watson (1993), Duckworth *et al.* (1992), Friedmann (1930a), Fry *et al.* (1988), Irvine (1977), Jackson & Sclater (1938), Lewis & Pomeroy (1989), Mackworth-Praed & Grant (1957), Nikolaus (1987), Short *et al.* (1990), Snow (1978), Todd *et al.* (1985, 1993), Urban & Brown (1971), Zimmerman *et al.* (1996).

Genus *CRINIFER* Jarocki, 1821

22. Western Grey Plantain-eater

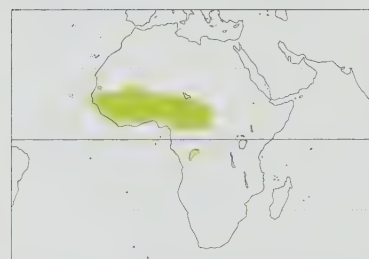
Crinifer piscator

French: Touraco gris **German:** Schwarzschnanz-Lärmvogel **Spanish:** Turaco Gris Occidental
Other common names: Grey Plantain-eater

Taxonomy. *Falco piscator* Boddaert, 1783, Senegal.

Forms a superspecies with *C. zonurus*, with which has been considered conspecific. Formerly listed as *C. africanus*, on grounds that Boddaert's name was based on illustration of bird unidentifiable as present species. Monotypic.

Distribution. S Senegambia, Sierra Leone and coastal Liberia E to Central African Republic (in N almost reaching Sudan border); also disjunctly in Congo and Zaire, along R Congo S of Stanley Pool.



Descriptive notes. c. 50 cm (tail 24-25 cm).

Adult has forehead, crown, lores, chin, throat and cheeks dark brown; shaggy nuchal crest of narrow, pointed hindcrown feathers up to 45 mm long, dark brown with whitish edges; sides of neck and upper breast dark brown, washed and streaked silvery; upper back silvery-grey with dark brown spots; wing-coverts grey with dark brown shafts and spot at tip, and narrow pale grey edges; rump and uppertail-coverts grey with dark shafts; central rectrices grey, becoming dark brown at tip, rest of tail blackish brown; secondaries and primary coverts blackish brown; primaries

blackish, with central third of inner webs white; lower breast, belly, flanks and undertail-coverts white, with grey feather bases and brown shaft streaks up to 2 mm wide; bill large, strong, bright lemon-yellow with greenish base; eyes dark brown; legs and feet brownish black. Juvenile similar to adult, but crest shorter.

Habitat. All types of open wooded savanna and cultivation, from the sahelian acacia steppe to near the edge of the rainforest zone, typically from sea-level to 1300 m. In Sierra Leone, commonest in palm "bush" and derived savanna (including *Lophira* zone), and in trees at edges of open grassland or swamps.

Food and Feeding. Wild and cultivated fruits, including figs, mangoes, guavas, sapotillas, oil-palm fruits and dates; also *Cordia senegalensis*, *Azadirachta indica* and *Zizyphus mucronota*.

Breeding. Breeds Jan-Aug and Oct in Senegambia, Jan-Jun in Mali, Apr-May in Nigeria, Mar-May and Sept-Oct in Ghana, and Jan-Apr in Congo. Nest a substantial platform of thin, dry sticks, c. 30 cm in diameter and 12 cm deep, some 6-15 m above ground in a leafy tree. Lays 2-3 oval and slightly glossy greyish white or pale bluish white eggs; incubation 27-28 days, by both sexes.

Movements. Largely sedentary throughout its range.

Status and Conservation. Not globally threatened. Locally abundant in Senegambia, reaching a density of 1 bird/ha in some areas of *Acacia scorpioides* woodland. Appears reasonably common

everywhere else, although no detailed information on numbers or on any potential threats. CITES III in Ghana.

Bibliography. Ash (1990), Bannerman (1933, 1953), Chapin (1939), Cheke & Walsh (1996), Dowsett (1989), Dowsett & Forbes-Watson (1993), Elgood *et al.* (1994), Fry *et al.* (1988), Giraudeau *et al.* (1988), Gore (1990), Green (1990), Grimes (1987), Halleux (1994), Jensen & Kirkeby (1980), Lamarche (1980, 1988), Lippens & Wille (1976), Louette (1981), Mackworth-Praed & Grant (1970), Morel & Morel (1990), Snow (1978), Thiollay (1985), Walsh *et al.* (1990).

23. Eastern Grey Plantain-eater

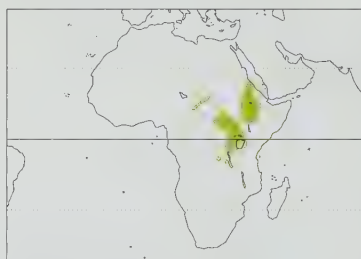
Crinifer zonurus

French: Touraco à queue barrée **German:** Bindenlärnvogel **Spanish:** Turaco Gris Oriental

Taxonomy. *Chizaerhis zonurus* Rüppell, 1835, Temben, Ethiopia.

Forms a superspecies with *C. piscator*, with which has been considered conspecific. Monotypic.

Distribution. Eritrea, Ethiopian Rift Valley and W highlands, S & W Sudan, N & NE Zaire S through Uganda and Rwanda to SE Zaire (R Niemba and upper R Lualaba), W Burundi, NW Tanzania E to Mwanza, Serengeti and R Malagarasi, and W Kenya from Mt Elgon S to R Mara; also disjunctly in SE Chad and N Central African Republic (where possibly sympatric with *C. piscator*).



Descriptive notes. c. 50 cm; 501-548 g. Distinguished from *C. piscator* by white in tail, scalloped (not spotted) upperparts with less conspicuous shaft streaks, unstreaked lower belly. Forehead, crown, lores and cheeks dark brown; shaggy nuchal crest of narrow, pointed hindcrown feathers up to 35 mm long, dark brown with whitish tips; sides of neck and breast dark brown, washed and streaked silvery; upper back and wing-coverts grey, feathers with dark shaft streaks, no dark spots at tip but with whole end dark, forming brownish scallops on greyish brown background; rump and uppertail-coverts grey with dark shafts;

middle third of outer tail white (conspicuous in flight), while central rectrices all greyish brown and becoming dark brown at tip; outer 4 rectrices whitish, grading to blackish brown at base, with broad blackish brown tips 50-65 mm deep; secondaries and primary coverts blackish brown; primaries blackish, with white central part of inner webs forming conspicuous wing-bar in flight; chin and throat brown, feathers of throat and upper breast tipped buffy-white; lower breast and upper belly whitish with indistinct grey-brown streaking; lower belly and vent off-white without dark streaks; bill large, greenish yellow; eyes dark brown; legs and feet brownish black. Juvenile similar to adult.

Habitat. Inhabits all types of open wooded savannas and cultivation; locally common also in many well-timbered suburban parks and gardens, particularly around Kampala and Entebbe in Uganda. Mainly below 1500 m, but occurs at up to 1900 m on Mt Elgon and in parts of Ethiopia.

Food and Feeding. Primarily fruits, including *Ficus* and *Musanga*; also flowers of *Daniellia oliveri* in West Nile Province of NW Uganda.

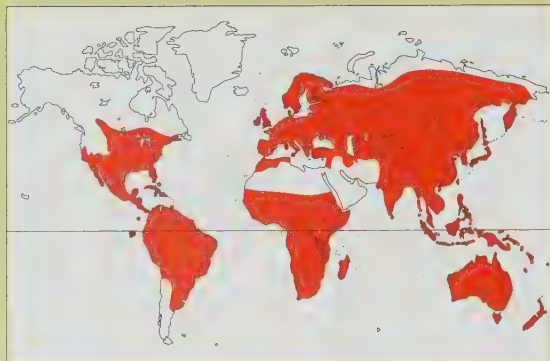
Breeding. Breeds Mar-May in Sudan, Jan-Mar in Ethiopia, Nov-Mar in Zaire, Oct in Burundi, Aug-May in W Kenya, and Mar-Apr and Aug-Jan in Uganda. Nest an untidy platform of dry twigs and sticks built near top of a tall leafy tree. Lays 2-3 white eggs; incubation by both sexes.

Movements. While largely sedentary throughout its range, some local dry-season movements, possibly governed by availability of food, have been noted in Sudan, Kenya and Tanzania.

Status and Conservation. Not globally threatened. Generally common in most parts of its range. Locally abundant in S Sudan, over much of Uganda and throughout the L Victoria basin.

Bibliography. Bannerman (1953), Britton (1980a), Buckley *et al.* (1989), Cave & Macdonald (1955), Chapin (1939), Cheesman & Sclater (1935), Dowsett & Forbes-Watson (1993), Friedmann (1930a), Fry *et al.* (1988), Jackson & Sclater (1938), Lewis & Pomeroy (1989), Lippens & Wille (1976), Mackworth-Praed & Grant (1957, 1970), Nikolaus (1987), Rutgers & Norris (1972), Short *et al.* (1990), Smith (1957), Snow (1978), Urban & Brown (1971), Zimmerman *et al.* (1996).

Class AVES
Order CUCULIFORMES
Suborder CUCULI
Family CUCULIDAE (CUCKOOS)



- Small to medium-sized, slender landbirds, most with fairly narrow bill and long tail; generally dark above and paler below, a few with all-dark plumage.
- 16-70 cm.



- Cosmopolitan.
- Mainly forest and woodland.
- 28 genera, 136 species, 295 taxa.
- 10 species threatened; 1 of these probably extinct since 1600.

Systematics

The 28 genera and 136 species of the Cuculidae are remarkably variable in their social behaviour and parental care, to a degree perhaps unmatched among the world's birds. Because they are so diverse in their breeding behaviour, the systematics of the group are of special interest. Brood parasitism has probably evolved independently at least twice in this family, but the relationships among the major groups are not well known, and estimates of the phylogeny of the cuckoos are needed to infer the conditions for the evolution of brood parasitism.

Certain fossils earlier considered to be of cuckoos were fragments of single bones, several of which have been reidentified as associated with other systematic orders. The oldest fossil of cuckoo resemblance is from the Eocene, at the time of the first appearance of most avian families: a remarkably complete Eocene fossil, *Foro panarium* from Wyoming, USA, has some cuckoo-like characters such as a pectineal process of the pelvis, and is said to represent a primitive group of landbirds; it has other traits resembling those of the turacos (Musophagidae) and the Hoatzin (*Opisthocomus hoazin*, Opisthocomidae). Other questionable records from the Eocene are *Uintornis* from the Middle Eocene of Wyoming and *Parvicuculus minor* from the Lower Eocene of England, which may both be coraciiform birds, and *Dynamospteryx velox* from the Eo-Oligocene of France.

The oldest known fossil cuckoo is *Neococcyx mcorquodalei* from the Lower Oligocene Cypress Hills in Saskatchewan, Canada; it appears to be related to the present-day Coccozinae of the New World. A terrestrial fossil cuckoo, *Cursoricoccyx geraldinae* from the early Miocene of Colorado, was smaller than the modern Lesser Roadrunner (*Geococcyx velox*); it had a less strongly developed coracoid, and tarsometatarsal elements apparently specialized for cursorial life, although the carpometacarpus was relatively longer than on modern terrestrial cuckoos. Fossil roadrunners apparently the same species as the Greater Roadrunner (*Geococcyx californianus*) and a possibly conspecific one known as Conkling's Roadrunner (*Geococcyx conklingi*) are known from the Pleistocene, and persisted well into the Holocene to less than 6000 years ago in arid regions of the south-western USA and Mexico; *G. conklingi* was larger, and may have been adapted to inland temperatures and a continental climate.

Fossil cuckoos are scarce, however, and records in the Northern Hemisphere are nearly all restricted to the Tertiary and Qua-

ternary, while those in the Southern Hemisphere are no older than the late Quaternary. In Madagascar, a fossil coua, *Coua primaeva*, is known from the Quaternary and a giant subfossil coua, *Coua berthae*, which was the size of a small turkey, is known from cave surface deposits. Recent and prehistoric fossils in the Old World include some of the Great Spotted Cuckoo (*Clamator glandarius*) in Israel and the Common Cuckoo (*Cuculus canorus*) in Europe. Those from the New World include Black-billed (*Coccyzus erythrophthalmus*) and Yellow-billed Cuckoos (*Coccyzus americanus*), two squirrel cuckoos (*Piaya*) and one lizard-cuckoo (*Saurothera*), three of these in the Dominican Republic; two anis (*Crotophaga*) in the West Indies and Yucatán; and the American Striped Cuckoo (*Tapera naevia*) in Brazil; as well as roadrunners in the North American south-west.

These known cuckoo fossils are unlikely to be representative of the true historical geographical distribution and morphological diversity of the cuckoos, nor do they reveal anything of when or where brood parasitism originated in this group. They do, however, establish that cuckoos were present in the Oligocene and Miocene in the New World, and that forms similar in their overall morphology occurred at that time, so the groups of cuckoos have a long evolutionary history.

Modern studies of molecular genetics indicate that the cuckoos are not closely related to any other families of birds. In morphology they appear closest to the turacos, and the two families are traditionally combined in the order Cuculiformes. They also appear similar to the doves (Columbidae), and in their leg muscles they bear a resemblance to some parrots (Psittacidae). The DNA-DNA hybridization data of C. G. Sibley and J. E. Ahlquist, however, do not support any of these assumptions of a recent common ancestor, and those authors concluded that the DNA comparisons showed that the cuckoos have no close living relatives.

Interestingly, molecular-genetic studies suggest that the Neotropical Hoatzin may also be a cuckoo (see Volume 3, page 24). The Hoatzin and the cuckoos are more similar to each other in DNA-DNA hybridization scores and in mitochondrial 12S and 16S nucleotide sequences than either is to other birds, and this may be due to their having originated from a common ancestor; indeed, the Hoatzin was included as a New World cuckoo by Sibley and Ahlquist. In the molecular studies, however, the Hoatzin was compared only with cuckoos and with Galliformes, and these two groups do not exhaust the candidate relatives of Hoatzin. Moreover, the DNA-DNA hybridization scores were



Subdivision of the
Cuculidae.

[Figure: Hilary Burn,
Francesc Jutglar, Chris
Rose & Ian Willis]

not well defined, and the defined nucleotide sequences were too short to give any sort of definitive answer in the groups that were tested.

Relationships within the cuckoos have been investigated, and groups of taxa have been recognized on the basis of their anatomy, molecular genetics, distribution and breeding biology. Studies of the bony palate, the postcranial skeleton, the leg muscles, and the geographical distributions of the major groups of cuckoo species show little agreement between sets of data. The cuckoos appear to have speciated independently of their hosts, and there is no suggestion of cospeciation of parasites and hosts which might shed light on the major relationships among the groups of cuckoos. Similarly, the ectoparasites of the cuckoos indicate no close relationship either to other groups of birds or within the cuckoos themselves.

On the basis of their DNA-DNA hybridization data and geographical distributions, cuckoos have been separated into six distinct families: the Old World parasitic cuckoos; the malkohas and couas; the coucals; the American cuckoos; the anis; and the New World ground-cuckoos. Another molecular-genetic test of relationships used the electrophoretic analysis of feather keratins, but the sampling of representative cuckoos was scanty, and not all species that were sampled were compared with each other. The more complete published similarity matrix, when re-analysed with a neighbour-joining programme, indicates that: (1) Old World and New World cuckoos are distinct groups; (2) the Old World parasitic cuckoos are most closely related to the malkohas; (3) this clade is the sister group of the coucals; (4) the New World Coccyzinae are most closely related to the anis; and (5) this clade is most closely related to the roadrunners and the pheasant cuckoos (*Dromococcyx*) in the New World ground-cuckoos. Other studies have used such parameters as nesting habitat and egg colour, but these characters appear to be questionable for the estimation of phylogenetic relationships, and in some cases, such as habitat, the traits do not directly reflect the genetic traits of the birds.

The present work recognizes a single family of cuckoos as set out by J. L. Peters in 1940. It agrees with the conclusions of the DNA-DNA hybridization studies, however, in so far as the Old World cuckoos can be seen to comprise one major group, including the brood parasites, the malkohas, the Asian ground-cuckoos, the couas and the coucals; and the New World species represent another group, although in contrast to the DNA conclusions the Coccyzinae are included with the other New World cuckoos. This arrangement is consistent with the results of a comparative immunological feather study by A. H. Brush and H. H. Witt published in 1983. The Cuculidae is thus divided into six subfamilies: in the Old World are the Cuculinae (Old World brood-parasitic cuckoos), the Phaenicophaeinae (Old World nest-building cuckoos with short, curved wings and long tails, including the malkohas, the Asian ground-cuckoos and the Madagascar ground-cuckoos or couas), and the Centropodinae (coucals); and in the New World are the Coccyzinae (New World arboreal cuckoos and lizard-cuckoos), the Crotophaginae (anis and guiras), and the Neomorphinae (roadrunners, New World ground-cuckoos, and New World brood-parasitic cuckoos). In this working hypothesis, the three Old World groups are in one clade and the three New World groups represent a second clade.

Since the relationships of the cuckoos are not well understood, however, alternative systematic arrangements have also been proposed. There is no common agreement, for example, on whether the ground-cuckoos and the couas of the Old World are more closely related to the malkohas of the Old World, or to the New World ground-cuckoos. Their anatomical similarities with the New World birds are postcranial and may reflect common but independently derived adaptations to terrestrial locomotion. The main basis for recognizing the malkohas and couas as a single group is the similarity of plumage and their occurrence in the Old World. Because they are short-winged birds it is unlikely that they would disperse across the ocean, and that terrestrial cuckoos were derived from a common ancestor that also was terrestrial and had limited ability to make long-distance move-



Although the cuckoos are usually treated as a single family, Cuculidae, some authorities prefer to separate them into as many as six families, basing this treatment at least in part on DNA-DNA hybridization data, as well as geographical distribution. One such family recognized by some scientists is Centropodidae, containing all the Old World coucals, here illustrated by the Coppery-tailed Coucal. The phylogenetic relationships of the various groups, however, remain very unclear, and further comparative studies are clearly needed.

[*Centropus cupreicaudus*, Moremi Game Reserve, Botswana. Photo: Philip van den Berg/ Bruce Coleman]

ments. Many authorities prefer to award the couas a subfamily of their own, but for the time being the most appropriate arrangement may be to recognize two tribes, Phaenicophaeini and Couini within this subfamily.

In 1988, in a comparative study of the postcranial skeletons of cuckoos, D. E. Seibel found that there were major differences both within and between the systematic groups that are recognized here, and the implications for the evolution of brood parasitism and the interchange or isolation between Old and New World cuckoos are dramatically different. In the estimate of phylogenetic relationships in the skeletal study, when turacos were taken as the reference outgroup, the cuckoos were inferred to have colonized the New World from the Old World on five occasions, and the Old World and New World parasitic cuckoos were each other's closest relatives (this group included also the New World nesting Yellow-billed and Black-billed Cuckoos), and there would be equally as many independent colonizations of Old and New World if the colonizations were assumed to go in the other direction or if reversals were assumed. This inference is based on the assumption that the skeletal characters are a true guide to the phylogenetic relationships within the cuckoos.

In the analysis based on skeletal characters, the ground-cuckoos of the Old World, including the Madagascar couas, were most closely related to the ground-cuckoos of the New World, and neither group was closely related to the arboreal cuckoos in their respective region. The characters that linked these ground-cuckoos, however, were all features of the synsacrum and tarsometatarsus, and these may have derived their structure independently in relation to the terrestrial mode of locomotion. The only traits that were regarded as shared derived characters linking the coucals, the couas, and the Old World and New World ground-cuckoos were: (1) the relative length of the ilioischial synsacrum (long); and (2) the contour and orientation of the anterior edge of the posterodorsal iliac crest (straight and more laterally directed). The author noted that this first character is problematic within the remaining cuckoos, and most had a form intermediate between the ones described as distinct. Also, within this first set of cuckoos, a second set was comprised by the couas, the Old World ground-cuckoos and the New World ground-cuckoos, which were uniquely linked only by the structure of the proximal end of the coracoid, involving the inflection of the

acrocoracoidal furcular facet; this, however, was an unordered and unpolarized three-state character, so it is difficult to interpret homology, and the author noted that definition of the states for this character is problematic. Third, within this last set of cuckoos, the Old World ground-cuckoos and New World ground-cuckoos, including the roadrunners, were linked only by the relative size and position of a tubercle on the tarsometatarsus, and by the relative position of the distal edge of the proximal foramen of the tarsometatarsus.

Because all these features were on the synsacrum and legs, or were problematic, and since all these cuckoos share a common pattern of cursorial locomotion, such skeletal characters are very likely to be adaptations for running on the ground, and are the kind of characters most likely to have evolved independently in these groups of cuckoos. No characters were described that would link these groups, except for the pelvic locomotor assemblage. Unless future phylogenetic estimates which are based on other kinds of characters such as molecular genetics indicate the same relationships among the groups of ground-living cuckoos in the Old World and the New World, it is therefore questionable whether these common skeletal traits can be attributed to a set of evolutionary synapomorphies among these terrestrial birds in different parts of the world.

On the other hand, only one character was found to link the remaining groups of cuckoos with each other. This was the supposed derived condition of the length of the posterior extent of the medial angle of the posterior dorsal iliac crest, relative to the width of the vertebral centra. The cuckoos that are so united are the New World anis, the New World parasitic cuckoos, New World coccyzine cuckoos such as the Black-billed Cuckoo and the Squirrel Cuckoo (*Piaya cayana*), and Old World malkohas and brood-parasitic cuckoos. The perception of this synsacral character as a derived synapomorphy is probably the result of selecting the turaco as the outgroup, that is, the standard of comparison against which the other characters are thought to be derived. It is uncertain, however, whether turacos are in fact the birds most closely related to the cuckoos. These long-legged birds may well have synsacra that are highly adapted to their own bounding manner of locomotion in trees (see page 488), so it is questionable whether their synsacral traits are good standards of comparison to assume the evolutionary polarity of characters in

The Banded Bay Cuckoo of southern Asia is sometimes placed in a monotypic genus, *Penthoceryx*, while some authorities prefer to include it within a rather broadly defined *Cuculus*.

The majority of taxonomists would, however, seem to agree that the most appropriate treatment is to place it in *Cacomantis*, as it shares a number of morphological traits with the species usually grouped therein. It differs markedly from other adults of this genus in its heavily barred plumage, but this is, in turn, very similar to the immature plumages of the same species.

[*Cacomantis sonneratii schlegeli*, Borneo.

Photo: Roland Seitre/Bios]



the cuckoos. The shape of the iliac crest in this set of cuckoos may be primitive (plesiomorphic) and may not represent a derived character, and there is no corroboration of the hypothesis that these cuckoos represent a monophyletic clade and are each other's closest relatives.

Within this set, a putative clade involving the Old World and New World arboreal cuckoos linked the parasitic cuckoos of both regions plus the Old World malkohas and the New World coccyzine cuckoos. The two characters identified as synapomorphies for this clade were: (1) the contour of the head of the scapula, though this was coded in four different character states (plus another in the Old World ground-cuckoos of the genus *Carpococcyx*, which had a "problematic" form that was "superficially" like that of the malkohas); and (2) the form of the ulna, but this was coded as a six-state character among the cuckoos and so is of questionable utility in this analysis.

Finally, nestled within this last set, another questionable putative clade was based on a single character of unlikely evolutionary status: the New World Black-billed Cuckoo and other *Coccyzus* cuckoos were reported to be the sister group to the Old World brood-parasitic cuckoos, but excluding the Old World koels and the Channel-billed Cuckoo (*Scythrops novaehollandiae*), which formed paraphyletic groups basal to the putative *Coccyzus-Cuculus* clade. The character on which this latter clade was recognized was the occurrence of a sulcus, or groove, in the anterior tibiotarsus, between the mesial foramen and the tubercle for the tibialis anticus and associated structures. In *Coccyzus* the sulcus is shallow and barely visible; whereas in most of the *Cuculus* clade it is deep, apart from in *Clamator*, which is similar to *Coccyzus*, and perhaps in *Pachycoccyx*, which was not examined as no complete skeletons are available in any museums. The difference in sulcus depth suggests that the character is not uniquely derived in this perceived clade, but represents a different origin of the sulcus in *Coccyzus* and in these Old World parasitic cuckoos; the occurrence of *Coccyzus* in this perceived clade appears to be the result of coding the three sulcus states as stages on a single evolutionary transformation, hence of an assumption of homology and not an independent analysis of characters.

The relationships of the couas, the Old World ground-cuckoos, and the malkohas among the Old World cuckoos are equally uncertain. The scheme that is followed here did not include a

molecular-genetic analysis of the couas, the Old World ground-cuckoos or the coucals, though it combined all these into a single putative clade with the Old World brood-parasites, and within this set it separated the coucals as a sister group to the other Old World cuckoos. Furthermore, no direct comparisons were made between the malkohas of the Old World and the arboreal cuckoos of the New World, where one was used as driver and the other as tracer in the DNA-DNA comparisons. Traits that are similar in the Old World ground-cuckoos, the couas and the malkohas are the soft, lax plumage with dove-like colours in some species in each of these groups; the platform nest, unlike the covered nest of the coucals; and their distribution in the Old World. None of these traits is exclusive to these cuckoos among the world's birds.

Recent analyses published by J. M. Hughes in 1996 have also associated the New World *Coccyzus* cuckoos (Black-billed and Yellow-Billed Cuckoos) with the Old World brood-parasitic cuckoos. An analysis based in part on the postcranial skeletal features, but also on egg colour and various aspects of behaviour, suggested that these nesting cuckoos are most closely related to the Old World parasites, and they may even have re-evolved their nesting behaviour from the brood parasites. The conclusion is consistent with the DNA-DNA hybridization data, which cluster the nesting arboreal coccyzine cuckoos of the New World with the Old World brood parasites. This would, however, be the only instance among the world's birds where nesting were lost in one lineage, and the descendants of the lineage then independently evolved nesting and parental care for a second time. The hypothesis should be tested with additional data, including molecular-genetic data.

Further studies of phylogenetic relationships among the cuckoos are clearly needed, and comparisons of their molecular genetics in particular are anticipated.

In defining species limits among cuckoos, voice is considered one of the most important parameters. The standard songs of a species occur over a wide geographical range, this range-wide similarity of voice having been demonstrated for species which are sufficiently well known. We can therefore use song as a major guide to the species themselves: enabling not only the identification of a species of cuckoo in the field, but also the determination of the biological limits of species where the

populations differ in appearance from place to place. If the songs are the same, then the populations are likely to be conspecific; while allowing for call and song repertoires as occur in the Brush Cuckoo (*Cacomantis variolosus*) and the Common Koel (*Eudynamis scolopacea*), if the songs are different, then the populations are likely to represent distinct species. If the populations differ both in morphology and in song, then it is very probable that the cuckoos involved are of distinct species.

Using song as a guide to the species limits of the cuckoos, most authors now recognize the African Cuckoo (*Cuculus gularis*) as a species distinct from the Common Cuckoo. The African birds have a yellow bill, they sing with an emphasis on the second syllable, "cuck-óo", and this syllable rises rather than drops in pitch compared with the first note. The Palearctic birds on the other hand have a black bill and sing with the accent on the first, higher note, producing the "cúck-oo" song that gave rise to the name of the family. The birds respond by approaching a source of their own kind of song but not that of the other type of song, so they behave as distinct species. In addition to their songs, these two cuckoo populations show constant differences in their morphology; in adult and juvenile plumages; and in bill colour and width, wide at the base in the African Cuckoo, and narrow in the Common Cuckoo.

Other species which are now recognized as distinct both in minor morphological traits and in song are the Asian Drongo-cuckoo (*Surniculus lugubris*) and the Philippine Drongo-cuckoo (*Surniculus velutinus*); the Himalayan Cuckoo (*Cuculus saturatus*) and Horsfield's Cuckoo (*Cuculus horsfieldi*); and Hodgson's Hawk-cuckoo (*Cuculus fugax*) and the Philippine Hawk-cuckoo (*Cuculus pectoralis*). The songs of the two drongo-cuckoos differ in the number of notes they contain and in their pitch and rise from note to note. The Asian Drongo-cuckoo's song is usually of six notes sung individually "one, two, three, four, five, six", rising up the scale, whereas Philippine Drongo-cuckoos have 8-10 notes in their song and these are given more rapidly in a series with all the notes closer to one pitch. The adult Asian Drongo-cuckoo has a glossy mantle and the tail is usually forked, whereas the Philippine Drongo-cuckoo has a velvety mantle and the tail is square-ended; the juveniles of these cuckoos also differ in plumage, Asian birds being black with small white spots, and Philippine birds uniformly rufous in colour.

The Himalayan Cuckoo's song is a high note followed by two or three lower notes, "hoop, hoop-hoop" or "tun-tadun"; that of Horsfield's Cuckoo is four low "hoop" notes, the first one soft. The two cuckoos also differ in size, though the largest Himalayan Cuckoos in their breeding range overlap in wing length with the smallest Horsfield's Cuckoos.

Finally, Hodgson's Hawk-cuckoo of Asia calls through the night, a shrill "gee-whizz, gee-whizz", with the first note higher in pitch than the second; the Philippine Hawk-cuckoo gives a series of short crescendo calls that rise and fall in pitch, each phrase of 6-8 notes lasting 1 second, and a prolonged crescendo call that rises and then falls in pitch. In the hand, these cuckoos differ in the shape of the wing, which is more pointed with the outer feathers longer than the inner primaries in Asian birds and more rounded in Philippine birds.

Wing shape is variable within populations of the Common Koel, and additional tape recordings are needed to test whether these may also comprise more than one species, as is frequently claimed.

On the other hand, several forms which replace each other geographically have songs which are apparently identical. This gives a strong indication that the birds would behave towards each other and towards their counterparts with the same songs as if they were of the same species. There are three particularly good examples of geographical populations of cuckoos which have apparently identical songs and therefore appear to be conspecific. The first is the Plaintive Cuckoo (*Cacomantis merulinus*), the grey-breasted Indian race of which is replaced by rusty-breasted races in South-east Asia, Malaysia, Indonesia and the Philippines. Thus, this species is considered to include the form *passerinus*, often reckoned to be a distinct species; this interpretation of conspecificity is consistent with the intermediate plumage of some juveniles in Assam, where the ranges of the two forms meet. In the second case, the northern and southern populations of the Brush Cuckoo combine grey-breasted forms and the rusty-breasted or Indonesian cuckoos of the race *sepulcralis*; the eye-rings of these birds are yellow from South-east Asia through the Philippines to New Guinea and the Solomon Islands, and even in some individuals in Australia, although some field guides state that the eye-ring colours differ between the northern and southern birds. The third major case is that of



Four species of lizard-cuckoo are currently recognized. The Jamaican Lizard-cuckoo is confined to its namesake island, and there are also endemic species on Hispaniola and Puerto Rico. The fourth species is polytypic, and is resident from the Bahamas to Cuba and its islands. In the past, lizard-cuckoos and roadrunners were sometimes lumped generically, largely on account of their somewhat similar dietary habits, but the two groups are now unanimously separated because of their very different morphology and general behaviour.

[*Saurothera vetula*,
Rocklands, Jamaica.
Photo: A. Greensmith/
Ardea]

The problem of cuckoo taxonomy is well illustrated by the Common Koel. Widely distributed from Pakistan and India east to the Philippines and Australia, it is commonly split into three separate species on the basis of bill colour and the plumage of the female. The vocalizations of all forms across the entire range appear, however, to be similar, indicating probable conspecificity. This adult female, photographed in a suburban garden, shows the typical head pattern of the Australian forms.

[*Eudynamys scolopacea cyanocephala*,
Brisbane, Queensland,
Australia.

Photo: Brian J. Coates/
Bruce Coleman]



the Common Koel, which occurs as a polytypic species through southern Asia and Australasia, although the subspecies groups *melanorhyncha* and *cyanocephala* have sometimes been raised to separate species status on the basis of bill colour and female plumage colour. In all of the above cases, part of the problem of comparing songs and species has been that each form has more than one vocalization, and so extensive recordings are required to determine whether the comparable types of calls are the same; for example, the Plaintive Cuckoo has a rising song, a cadence song, and a single whistle.

Finally, the Little Bronze-cuckoo (*Chrysococcyx minutillus*) occurs in many forms from South-east Asia through the Malay Archipelago and the Philippines to New Guinea and northern Australia, and song appears to be a useful guide to assessing whether just one species or as many as four are involved. More field recordings are needed to be certain, but, because the songs appear to be the same throughout this wide range, both the green-backed and rusty-backed forms appear to represent a single species.

The same criteria of vocal identity are applied to the nesting non-parasitic species of cuckoo. The African Black Coucal (*Centropus grillii*) is sometimes considered conspecific with the Lesser Coucal (*Centropus bengalensis*) of Asia and with the Madagascar Coucal (*Centropus toulou*) of Madagascar, but the voices of these cuckoos differ, as do their sizes and the details of their plumage, so all three are here regarded as distinct species. Nevertheless, the species limits of coucals are uncertain in some cases, as the songs do not always differ noticeably between what appear to be distinct species. Moreover, coucals tend to exclude other species from their territories and geographical range even when these are not the most closely related forms.

Morphological Aspects

One of the more distinctive features of the cuckoos is the zygodactyl foot, with the inner and outer toes directed backwards and the other two toes directed forwards. The plumage is soft and lax in most species, the legs are short, and the tail is long, often longer than the rest of the bird. The bill is usually slender, with the upper mandible arched.

All cuckoos are capable of flight, although this varies from the swift and direct flight of the long-winged, long-distance migrants such as the Common and Black-billed Cuckoos of northern temperate zones, to the gliding flight of the short-winged tropical forest-living malkohas, and the awkward slow flight of

the short-winged tropical coucals. Wing shape is conservative within cuckoo species generally. Even the resident or intra-African migrant African Cuckoo has the same pointed wing shape as the Common Cuckoo, the species to which it is most closely related.

Cuckoos are medium-sized birds, having a total length within the range 16–70 cm. They vary in mass from 17 g in the smallest, the Little Bronze-cuckoo, to 550 g in the largest, the Greater Black Coucal (*Centropus menbeki*). Most cuckoos have a slender body form and short tarsi, and are arboreal, while others are more heavy-bodied, have long tarsi and are terrestrial. Other notable features of the cuckoos are: long eyelashes; ten primaries, 9–13 secondaries, ten rectrices (eight in the anis); the eutaxic wing with a secondary feather for each secondary covert; the feather after shafts absent or very small; absence of a cere; scutellate tarsi; and a naked and bi-lobed oil-gland.

The skeleton of cuckoos does not exhibit any traits that are unique among birds, and many features appear to be primitive (plesiomorphic) characters that have been retained from ancestral landbirds. The details of the zygodactyl foot differ from those of other birds with a generally similar toe arrangement, that is the trogons (Trogonidae), the turacos, the parrots, the owls, the Cuckoo-roller (Leptosomidae), and the Piciformes, including the woodpeckers (Picidae). Cuckoos have a desmognathous palate, a small vomer, a holorhinal nasal septum, no basipterygoid processes, 14 cervical vertebrae (13 in the Old World crested cuckoos of the genus *Clamator*), 17–18 presacral thoracic vertebrae, a pectineal or preacetabular process on the synsacrum, and two bony canals in the hypotarsus. Many other morphological aspects of cuckoos are variable within the group and, curiously, are not closely associated with each other, nor do they correspond well with the subfamilies as now recognized. These include: the shape of the sternum, which is notched, windowed or intact; the presence or absence of certain leg muscles; and the form of the syrinx, which can be bronchial, tracheobronchial or intermediate in its position.

Some of their morphological features are associated with the lifestyle of these birds, in particular within the terrestrial cuckoos when compared with the arboreal cuckoos. The pelvic muscles of the roadrunners originate farther forward and to the side than in the arboreal cuckoos, and these may support the stability and balance of a running bird that places its weight alternately on one leg and then on the other. Roadrunners also have elongated leg bones, especially the tarsometatarsus, and the toes are mobile and flexible, allowing the bird to vary the shape of the foot on a flat surface.



Some cuckoo species possess strikingly glossy metallic plumage colours, none more so than the African glossy cuckoos of the genus *Chrysococcyx*. The male Diederik Cuckoo has beautiful iridescent green upperparts with a copper-coloured sheen. This species is one of several cuckoo species which exhibit sexual dimorphism in plumage, the female being much browner above and less white below, and with browner irides.

[*Chrysococcyx caprius*, Wadi Darbat, southern Oman. Photo: Hanne & Jens Eriksen/Aquila]

The plumage of cuckoos is variable in texture, and is usually soft. The delicate feathering tends to become wet in the rain, and cuckoos are often seen sunning themselves to dry after a rain shower. Anis have smooth, dense glossy plumage, and this texture appears to be related to their more frequent habit of seeking food in wet grass and foliage, where their feathers consequently become wet. In cool, wet weather they hang out their wings spread to the sun's rays, like storks or vultures.

Some coucals and malkohas have elaborate feathers on the neck, the hackles, which bear conspicuous stiff feather shafts, the colour of these shafts sometimes contrasting with that of the rest of the feather. The Blue-faced Malkoha (*Phaenicophaeus viridirostris*) of India has unique bifurcate feathers on the chin and breast which are formed by stiff barbs that cling together on each side of the central rachis, which itself protrudes as a fine, free, black hair-like bristle in the centre of the fork. The most bizarre feathers, however, are found in the Scale-feathered Malkoha (*Phaenicophaeus cumingi*) of the Philippines, which has the barbs of each feather of the head and throat united into a single shiny, metallic-looking, flat blue-black shield that contrasts with the otherwise whitish plumage of the head and throat; these iridescent ornaments develop even on the short-tailed juvenile birds. Other malkohas develop their elaborate adult-like plumage early in life, as demonstrated by the other Philippine species, the Rough-crested Malkoha (*Phaenicophaeus superciliosus*), which grows its red bristle-like head feathers while still a short-tailed juvenile.

Most adult cuckoos have a long tail, and this is used both as a rudder in slow flight and also, in the case of the cursorial ground-living cuckoos, as a steering device. The tip of the tail is often contrastingly coloured: the Chestnut-breasted Malkoha (*Phaenicophaeus curvirostris*), for example, has a green tail with a red tip, while many other species of malkoha and, in the New World, coccyzine cuckoos have either a broad or a narrow white tip to the tail.

The plumage is cryptically coloured in many brood-parasitic species, although the males of some glossy cuckoos are bright, and in other glossy cuckoos both the males and the females are brightly coloured. There may therefore be an interesting evolutionary conflict between sexual selection on the one hand and, on the other, ecological crypsis to avoid being detected by the host species. Downy feathers in the cuckoos are limited to the apteria. The greatest difference between adult and juvenile plumages is exhibited by the parasitic species and by the coucals, while some of the latter also have intermediate plumages between the juvenile and the adult stages.

The plumages of several cuckoos may be adaptive to ecological problems of recognition and social associations with their hosts. The juvenile plumage of Common Koels somewhat resembles that of their host species: black like crows (*Corvus*) in India, where the koels parasitize crows; and streaked brown in Australia, where their hosts include Brown Honeyeaters (*Lichmera indistincta*). Some cuckoos of the genus *Cuculus* resemble hawks in their plumage and flight, and in some parts of Europe the geographical variation in the proportion of female Common Cuckoos that are grey or rufous in plumage parallels that of *Accipiter* hawks and *Falco* falcons, although how this resemblance aids the female cuckoo in getting an egg into the nest of her hosts is unknown. The variation in plumage colour may also be density-dependent, such that the rarer form has an advantage in not being recognized by the naive young songbird hosts, while the commoner form is recognized and chased by the nesting hosts. A similar situation exists in some polymorphic falcons, hawks and owls, where the rarer colour morph may have an advantage in not being recognized by its prey.

Sexual dimorphism in plumage colour occurs in a few cuckoos, perhaps more so in the Old World parasitic species than in others. Sexual plumage dimorphism is found in some malkohas, most notably Raffles's Malkoha (*Phoenicophaeus chlorophaeus*), and in the African and Asian glossy cuckoos and the Common Koel. The iris colour, and sometimes its pattern (a ring of colour in the iris), also differ between the sexes in some cuckoos, both in the glossy cuckoos and in several malkohas.

In most species, males and females are usually the same in body size, but occasionally they differ. Males of several brood-parasitic species are slightly larger, by less than 10%, than their females. On the other hand, a number of cuckoos exhibit reversed sexual size dimorphism, the female being the larger of the sexes. Females are larger than males in the brood-parasitic Channel-billed Cuckoo and also in many coucals, one of which is known at times to be polyandrous; the degree of sexual dimorphism is constant across subspecies in some coucals. Females are larger than males also in the co-operatively breeding anis, nesting studies of which have shown the dominant female to leave more offspring than the subordinate females in their communal nest. In another co-operative breeder, the Guira Cuckoo (*Guira guira*), however, females are not larger than males. In the anis and the coucals, the females compete with other females: in the former instance for the position of eggs in the communal nests, and in the African Black Coucal for territories with more than one male to help in parental care. Females of most other coucals are also larger than their males, even among monogamous species such as the Pheasant Coucal (*Centropus phasianinus*), where the fe-

The cuckoos of the New World subfamily Coccyzinae form a group of nest-building cuckoos. Along with their Old World counterparts in the Phaenicophaeinae, they are characterized by a long, graduated tail, this being particularly marked in the aptly named Squirrel Cuckoo. This species inhabits tropical forests, old secondary forests, mangroves and plantations in Central and South America, where it has evolved into 14 subspecies which vary in depth of coloration and also, to some extent, in plumage pattern. In the northernmost part of the range, the two forms occurring in southern Mexico, darker *thermophila* and brighter and paler *mexicana*, appear to show little or none of the intergradation which would be expected of adjacent subspecies, and they may even be two distinct species.

[*Piaya cayana thermophila*,
Selva Lacandona,
Chiapas, Mexico.

Photo: Patricio Robles Gil/
Sierra Madre]





male is half as heavy again as the male. In these cuckoos where the female is larger than the male, body size appears to be related to aggressive behaviour, with females taking a majority role in social dominance within the group or in the territorial behaviour of the pair, much as in some hawks, falcons and owls. This contrasts with the situation among some other bird groups, such as the buttonquails (Turnicidae), the tinamous (Tinamidae), the painted-snipes (Rostratulidae), the jacanas (Jacanidae) and certain shorebirds (Scolopacidae), where reversed sexual size dimorphism is associated with a polyandrous mating system. Females of the African Black Coucal, which are larger than males, are, however, sometimes polyandrous.

The greatest degree of size dimorphism occurs in the coucals of smaller body size. This differs from the more standard situation in other families of birds, in which the males are relatively larger than females in the larger species. Nevertheless, size di-

morphism is certainly quite marked in some of the larger coucals too, such as the Greater Black Coucal.

The pattern of wing moult is a shared, derived trait within the Old World parasitic cuckoos. In cuckoos, the feathers are replaced not from the innermost outwards as in most birds, but from separate centres within the wing. Moult proceeds by forward or backward leaps across one or more adjacent primaries. In the Old World parasitic cuckoos, the primaries are shed in a more distinct pattern of saltatory or transilient moult than in other cuckoos. The crested cuckoos are unique in that their wing moult progresses in a regular pattern, with the sequence of primaries 6-9-pause-7-10-pause-8-5 (or -5-8). This moult, together with the plumage and skeletal traits, indicates that these cuckoos are a single derived group. The long-tailed cuckoos (*Cercococcyx*) have a unique moult of first the odd-numbered primaries, then the even-numbered ones. Other cuckoos have yet other patterns of transilient moult of the primaries, with the Common Koel quite different from the other Old World parasitic cuckoos. Moult is a protracted affair, and in the case of the Common Cuckoo takes many months. In some cuckoos it may be delayed for months. In others the moult is interrupted, with birds in their first year not in active moult and with the wings bearing a mixture of juvenile and adult feathers; this is amply demonstrated by the Great Spotted Cuckoo, where these feathers are of noticeably different colours.

Morphological and other features distinguishing the six sub-families are outlined in the following paragraphs.

The Cuculinae are brood-parasitic cuckoos of the Old World. Most are migratory and have long, pointed and narrow wings. The tail is long and often graduated, with the central feathers longer than the others. The legs are short, with the tarsus feathered at the base. Some species resemble hawks in their shape, their brown or grey plumage colour and streaked (juvenile) or barred (adult) pattern, and also their swift and direct flight; several in fact bear the name "hawk-cuckoo". Their hawk-like plumage may elicit mobbing from their hosts, and this may aid the cuckoo in finding the hosts' nests in which to lay eggs. Other parasitic cuckoos are small, and in their general appearance more like passerines. Most Old World brood parasites are dull in plumage, and their cryptic appearance may allow them to avoid detection by their host species. The glossy cuckoos and the bronze-cuckoos, however, can be fairly conspicuous in their

Most cuckoos have a long tail, used both as a rudder in flight and for manoeuvring among foliage and on the ground. The malkohas, which hop along the branches and tangled creepers of tropical forests, make twisting movements with the tail to keep their balance, before turning to seize an insect. The sole African malkoha, the Yellowbill, is a confirmed skulker, like most cuckoos.

[*Ceuthmochares aereus australis*, Malindi, Kenya. Photo: Alan Weaving/Ardea]



Although, in most cuckoo species, the sexes are similar in size, males of some brood-parasites are sometimes slightly bigger than their mates. In a few instances, however, reversed sexual size dimorphism is apparent, the female being the larger of the sexes. This phenomenon is exhibited by many coucals, as well as by the rather strange-looking brood-parasitic Channel-billed Cuckoo of Australia, the largest of all brood-parasitic birds and easily recognized by its huge two-tone bill, which it uses to pluck fruit, particularly figs.

[*Scythrops novaehollandiae*, Australia. Photo: Roland Seitre/Bios]

Totally restricted to Madagascar, where nine species currently survive, with a tenth now almost certainly extinct, the couas are large cuckoos possessing soft, lax plumage of dove-like browns and rufous, except for the blue plumage of the Blue Coua (*Coua caerulea*). They also have long tails and large feet, as well as areas of brightly coloured bare skin around and behind the eye, and often, like the malkohas, they have long eyelashes.

A few couas are arboreal in their habits. The Crested Coua, for example, generally forages at 5 m or more above ground, often in the canopy of the forest; it is locally common, and still hangs on in degraded forests. For the most part, however, the couas are terrestrial, as typified by the Red-capped Coua. This species spends much of its time on the ground, where it walks around among the litter and debris of open forest and other wooded areas in search of food; this is the only terrestrial coua species to be found commonly in degraded wooded habitats. Both these species feed mainly on large insects, supplemented with some fruit, the Crested Coua also taking some snails and chameleons.

[Above: *Coua cristata*, Madagascar.
Photo: Konrad Wothe/
Bruce Coleman.

Below: *Coua ruficeps*, Madagascar.
Photo: Roland Seitre/Bios]





A notable feature of some brood-parasitic cuckoos of the genus *Cuculus* is their resemblance to raptors. Not only are they long-winged and long-tailed, but their plumage is also grey or brown and clearly barred, recalling *Accipiter* hawks, and their flight is typically swift and direct. The Common Hawk-cuckoo is one of several species whose vernacular name reflects this similarity. The hawk-like plumage of these cuckoos may elicit mobbing from their hosts, thereby perhaps helping the cuckoo to locate the hosts' nests.

[*Cuculus varius varius*,
Bharatpur, India.
Photo: Göran Ekström]

metallic plumage colours, especially male glossy cuckoos of the African species. The nestlings of these brood-parasitic cuckoos are naked at hatching, and the inside of the chick's mouth is brightly coloured but lacks special visual marks.

The subfamily Phaenicophaeinae consists of nest-building, non-parasitic cuckoos of the Old World tropics, mainly in southern Asia. These have strong, unfeathered tarsi, short, rounded wings, and long graduated tails that are tipped with bold spots and bars. This group includes the malkohas, the long-tailed skulking arboreal cuckoos of the forests. Many have brightly coloured unfeathered skin around the eye and face, and the bill is large, arched, and often brightly coloured. The feathers often have wide vanes on the wings and stiff, shiny shafts of a colour that contrasts with the other parts of the feathers. Nestling malkohas have conspicuous palatal spots. The three large ground-cuckoos of the genus *Carpococcyx* inhabiting southern Asia, and also tentatively placed in this group, have long, unfeathered tarsi, but they are similar to the malkohas in the dove-like greens and blues of the plumage, the bright bare skin around the face, and the long eyelashes, and also in their nesting habits. Finally, the couas, the large cuckoos endemic to Madagascar, have soft and lax plumage with colours of dove-like browns and rufous, but blue in the Blue Coua (*Coua caerulea*). They show a long tail and large feet, and colourful bare areas of skin around the eye; like the malkohas, they often have long eyelashes. As a group, the couas are terrestrial, though a few are more arboreal. As with the malkohas, the palate of the nestling coua is conspicuously patterned.

The coucals forming the subfamily Centropodinae are mainly large, skulking, heavy-bodied terrestrial birds with long, stout feet, a long straight claw on the inner hind toe in most species, short rounded wings, and a long broad tail. The plumage is black, rufous-brown or whitish, or a combination of these colours. They live in the Old World tropics from Africa and Asia to Australia, New Guinea and the Solomon Islands, and occur on many isolated islands in the Australasian region, where they have differentiated into several species. They are morphologically the most distinct group of cuckoos. The single genus has 28 recognized species, the largest number of any cuckoo genus, and it contains birds with the largest body size of the cuckoos; all species essentially show variations on a similar body form. The chicks have a strange stiff hair-like down, and conspicuous coloured spots on the palate.

In the New World, the nest-building Coccyzinae are the counterparts of the Old World Phaenicophaeinae and, like the latter, have a long, graduated tail. Most are arboreal in their behaviour, and most are insect-eaters, feeding especially on caterpillars; several are large-bodied cuckoos living only on islands of the

Caribbean, where they feed on lizards. Some species have long wings, and several of these cuckoos are long-distance migrants between continental North and South America, or between breeding areas in southern parts of South America and non-breeding quarters in northern South America. These cuckoos are nest-builders, and the young, where known, have contrasting papillae on the inside of the mouth.

The New World Crotophaginae are nesting, group-living cuckoos characterized by a thick bill, thick legs and a long tail. The three anis species have black plumage, and the South American Guira Cuckoo is streaked brown. The nestlings have pale markings on a pink mouth. Anis often have a strong smell, especially when they are roosting in groups at night, and this may attract blood-sucking bats and predators. Their generic name *Crotophaga* means eater of "croton oil", which is the oil of the East Indian croton tree (*Croton tiglium*) and is a foul-smelling medicinal purgative. The anis are awkward in their movement, with wings and tail seemingly disconnected from the body, and they progress in rapid jerky movements, unlike the smooth moves of arboreal cuckoos in the New World. Anis are slow and clumsy as they flutter and clamber through low bushes and weeds, where their flopping wings and waving tails may flush insects in dense vegetation. The Guira Cuckoo on the other hand is much more graceful, its flight having been described as recalling a kite in the wind.

The final subfamily is the Neomorphinae, the New World ground-cuckoos. These cuckoos are long-legged and long-tailed, and vary in their breeding behaviour. Most are nest-builders, but three are brood parasites. The group includes the lizard-catching roadrunners of semi-arid regions of North and Central America, and the large South American forest-living ground-cuckoos which follow army-ant swarms. At least some nesting species have nestlings with conspicuously coloured mouth spots. The roadrunners can cover considerable distances at speeds of up to 30 km/h when chasing their lizard and grasshopper prey. Running at top speed, a bird holds the head and the tail level with the ground and swings its tail like a rudder; birds often course along roads, paths and dry stream beds. Although the Greater Roadrunner usually walks and runs on its daily routine rounds, it can fly, although even when sitting on an elevated perch it usually stays within a hop and a flap of the ground.

Habitat

Cuckoos are for the most part birds of forest and woodland. The majority of the species are arboreal and feed in trees, many in

evergreen forests in the tropics and subtropics. The forests provide a wide variety of insects, especially caterpillars, which form a substantial part of the diet of these birds (see Food and Feeding). For most bird species, one of the most important considerations is that of finding suitable breeding habitat, but the brood-parasitic cuckoos have dispensed with this complication, so that their only concern in this respect is that of finding the handily situated nest of a potential host species that is ready to be parasitized. This has helped to give many such species fairly catholic tastes in terms of habitat, with the result that it is no real surprise to find them in any sort of landscape, especially if at least a few trees are present.

Within the general theme of forests, cuckoos' habitats can be fairly varied, but for many species the type of forest frequented includes relatively undisturbed primary tropical rain forests, and indeed for several species this is the chief or the only habitat. Other cuckoos occur in secondary forest, and some of these have adapted to living in plantations, particularly of cocoa, stands of which contain larger natural trees as an overstorey layer of shade. "Forest" habitats range from primary evergreen to semi-arid scrub in Madagascar.

While woodland or forested areas represent the main habitat for most cuckoos, some species are more adaptable. In Europe and Asia, for instance, the Common Cuckoo is a good example of a species which occurs in virtually any habitat where suitable host species are present and nesting. In Britain, many Common Cuckoos regularly occur in and around reedbeds, where they parasitize Reed Warblers (*Acrocephalus scirpaceus*), while another very common host is the Meadow Pipit (*Anthus pratensis*), which breeds in very open, often totally treeless habitats such as heaths and moorland. Some cuckoo species have become sufficiently adapted to life alongside man that they can quite frequently be found in city parks and gardens, as is the case of the Common Koel, the Plaintive Cuckoo, the Diederik Cuckoo (*Chrysococcyx caprius*), the Lesser Coucal, the Squirrel Cuckoo and the ubiquitous Common Cuckoo.

A few cuckoos live in coastal mangroves. These include, not surprisingly, the Mangrove Cuckoo (*Coccyzus minor*) in the Neotropics, as well as some malkohas and coucals in southern and South-east Asia and Indonesia. Mangroves are inhabited also by some parasitic cuckoos in Australasia, especially the Little

Bronze-cuckoo, which parasitizes flycatchers of the genus *Gerygone*. Coucals are often found in swampland and marshy habitat, but they also occur commonly in areas of rank grass and in the undergrowth at the forest edge.

Several members of the family live in open brush country in semi-arid regions, such as most of Australia, the plateau country of Africa, Mexico and the drier parts of Central America, and sub-Amazonian South America. In Australia, the Pallid Cuckoo (*Cuculus pallidus*), as well as being present in open forests, woodland and mangroves, occurs in scrub and on thorny plains and even in the arid interior, and it is in fact commonest in drier country. Barren mountain slopes are also occupied by cuckoos, as for example in the Caribbean, where the Hispaniolan Lizard-cuckoo (*Saurothera longirostris*) can be seen in such habitat.

Several cuckoos live in seasonally hot, arid and semi-arid habitats. These include the roadrunners of the New World, some coucals in Madagascar, and several brood parasites in the Old World. While the dry-country brood parasites escape the extreme conditions when they migrate, the others live as permanent residents in the deserts.

The altitudinal range occupied by cuckoos in general is not particularly wide. The majority of species are birds of the lowlands and the lower hills, with relatively few ascending much above 2000 m. Nevertheless, some can be found above 2500 m in several parts of the world. The Jacobin Cuckoo (*Clamator jacobinus*) occurs up to 3000 m in Africa, and even reaches 4200 m on passage in the Himalayas, while the African Emerald Cuckoo (*Chrysococcyx cupreus*) breeds at 3000 m in Ethiopia. In Nepal, the Large Hawk-cuckoo (*Cuculus sparveroides*) breeds to 3000 m, the Indian Cuckoo (*Cuculus micropterus*) occasionally higher, to 3700 m, and the Common Cuckoo to 3800 m; and in China, Horsfield's Cuckoo occurs as high as 4500 m in Sichuan. In the highlands of New Guinea, the Rufous-throated Bronze-cuckoo (*Chrysococcyx ruficollis*) can be found in montane forest at up to 3350 m, although it prefers somewhat lower elevations.

In South America, Yellow-billed Cuckoos are common on passage up to 2800 m in the Andes of Colombia and Ecuador, and migrants occur as high up as 4200 m in Venezuela, though this species breeds at much lower altitudes. Similarly, the Dark-billed Cuckoo (*Coccyzus melacoryphus*) is mainly a lowland breeder, but it reaches 2800 m in semi-arid montane valleys of

Characteristic of many ground-dwelling birds are long, unfeathered legs, as shown by this Coral-billed Ground-cuckoo, the largest of the three Asian *Carpococcyx* species. These Old World ground-cuckoos are similar to the malkohas and the coucals in having short, curved wings and a long tail, and in the soft dove-like colours of their plumage, their bright bare facial skin, and their long eyelashes, and also in some of their nesting habits; the relationships of these three groups, however, remain debatable. The Coral-billed Ground-cuckoo is one of a number of cuckoos considered near-threatened, with a small range limited to Thailand and Indochina.

[*Carpococcyx renauldi*,
Thailand.

Photo: Roland Seitre/Bios]





The Long-billed Cuckoo, a New Guinea endemic, is sufficiently distinct from other cuckoos to be placed in a monotypic genus. It does, however, display the soft plumage colours characteristic of most of the Cuculidae. The immature, shown here, has a dark iris, whereas that of the adult male is red: this is a common age difference among cuckoos in general. As with many New Guinea birds, this is a very poorly known species.

[*Rhamphomantis megarhynchus megarhynchus*, south-east New Guinea. Photo: Brian J. Coates]

Ecuador and in the Peruvian Andes, with several records at 3600 m. Even the Lesser Roadrunner, a species typical of lowland scrub in central America, occasionally ascends to 3000 m.

General Habits

Cuckoos are generally solitary birds, and are more often heard than seen. The calls of some species are among the most characteristic sounds of the forests and woodlands (see Voice), especially in the tropics. As a whole, they are mostly arboreal and spend much of their time in the trees, although the large coucals and couas and some other tropical cuckoos are terrestrial birds. While most species live solitary lives, or live in pairs, and call mainly in the breeding season, others are colonial and interact with each other at all seasons.

Cuckoos are mainly diurnal. Again, however, both the nest-building species and the brood-parasitic cuckoos often call also at night, and in their habits they can be to some extent night birds, along with the owls (Strigiformes) and the nightjars (Caprimulgidae).

Cuckoos live in cold and wet conditions, as well as in more hospitable ones. In the rain their plumage becomes wet, and they often warm and dry their bodies in the sun before they can feed. In fact, many cuckoos are best observed when they sit on a high open perch in the early morning or after a shower of rain, with the wings and tail spread and the back feathers raised to expose the skin to the sun. Sunning behaviour is well known for the coucals and the small glossy parasitic cuckoos of the Old World, and for *Coccyzus* cuckoos, roadrunners and anis in the New World. The couas of Madagascar also sunbathe regularly. The Giant Coua (*Coua gigas*), for example, in the early morning, ruffles its feathers and droops its wings to absorb heat in sunny spots on the forest floor. The Pheasant Coucal is similarly conspicuous in its sunning behaviour.

The anis, especially, seem to get their feathers wet as they forage in wet grass and herbaceous vegetation. They also adapt to cool conditions by lowering their body temperature a few degrees at night in a mild nocturnal torpidity; even when the body temperature drops from 40.8°C to 32.6°C and 34°C after two days of fasting, the birds are still able to fly.

At the opposite extreme, the few cuckoos which live in hot, arid climates are faced with different problems, and it is worth examining some of their responses to these problems. The Greater Roadrunner exhibits a number of adaptations to desert life. These include dorsal skin with melanin, a high body weight, a salt-secreting nasal gland, an ability to reabsorb water through the cloaca, the ability to cool down through evaporation of body water through the skin as the major pathway of water loss, an ability to lower the body temperature at night, and the use of solar radiation as a source of energy. These cuckoos bask in the morning sun by exposing their unfeathered and pigmented black dorsal skin, which absorbs the sun's radiant heat like a solar panel. In winter, in the seasonally cold deserts, they sunbathe in the early morning by spreading their back feathers, drooping their wings and holding them away from the body, and exposing their dorsal skin to the sun. This sunning behaviour reduces the energetic cost of raising their body temperature from its night-time level; the savings can be as much as 60%. Roadrunners also have subcutaneous fat deposits to aid their winter survival; it should be noted, however, that these reserves are not present only during the winter period, since some breeding males also have fat deposits under the skin.

Roadrunners have a metabolic rate similar to that of other birds of the same body size: 0.92 ml oxygen/g-h at air temperatures of 27°–36°C. At temperatures above 36°C their oxygen consumption increases, and at 44.3°C it is 31% above the standard metabolic rate. Roadrunners maintain their basal metabolic rate at air temperatures as low as 9°C when they bask in the sun, but without solar radiation their metabolism begins to rise if the air temperature falls below 27°C, and their oxygen consumption increases with temperatures below this level. By controlling their behaviour, they reduce their food demands: they adopt the habits of their main food, the lizards of the desert, and use the sun when they can. Roadrunners remove excess heat load by evaporative loss of water through the respiratory system and through the skin. During extreme heat, the adults crouch on the ground, spread their wings, and lift the upper set of feathers to allow air to flow between the layers without directly exposing the down feathers to the sun. They also lose heat by fluttering their gular region, panting, and extending their wings to expose the lightly feathered areas underneath the wing, and by a system of heat exchange in the arteries and veins that cool the brain.

The Cuculidae are notable for the zygodactylous arrangement of the toes, the inner and outer ones pointing backwards and the other two forwards. This trait is shared with only a few other bird families, containing almost exclusively arboreal species, but is exhibited by all cuckoos including terrestrial ones. Some of the latter have flexible toes, so that the shape of the foot can be modified on a flat surface. The Lesser Ground-cuckoo hops or walks among leaves on bare ground with jerky, chicken-like movements of its head. It shows the bright bare facial skin that is common among cuckoos, in this case coloured blue, black and yellow.

[*Morococcyx erythropygus*.
Photo: John S. Dunning/
Ardea]



Nestling roadrunners, too, are able to warm themselves when they move into a patch of sunlight in the nest. Their skin, apart from that on the chin and the vent, is pigmented black to absorb solar radiation. They are able to cool themselves by fluttering their gular skin and aligning their bodies in the shade of a cholla cactus in which the nest is built. The water lost in gular-fluttering and cutaneous evaporation is balanced by salt secretion of the nasal glands, and by the adult regurgitating a clear liquid (water?) to the nestling roadrunners.

The adults conserve their water by reabsorption through the lining of the rectum, caeca and cloaca, and they excrete salt through the nasal glands in front of the eye, though the salt glands are most prominent in the nestlings. Roadrunners can maintain their body weight without drinking, and they obtain water from food such as reptiles and rodents. Nevertheless, they do drink when water is available, and they have been found drowned in desert pools, indicating that they are attracted to water sources. Breeding adults consume their young nestlings' urine and faeces, which are enclosed in a faecal sac. The nestlings' excreta contain more water than those of the adults, and the adults can satisfy part of their daily water requirements in the course of their normal parental care.

In addition, the adult roadrunners stay inactive in the shade during the hottest period of the day, and hunt mainly during the early morning and late afternoon, when their insect and lizard prey are most active. Roadrunners have a variable clutch size and asynchronous hatching of the eggs, allowing the parents to track changing food resources, although these traits are not unique to cuckoos in desert habitats but occur also in Black-billed and Yellow-billed Cuckoos, which live in less arid habitats.

Adult cuckoos are eaten by larger predators such as raptors and large primates, and their nestlings and eggs are taken by a variety of predators, including birds, mammals and snakes. Both young and adult brood-parasitic cuckoos are eaten by mammal predators, such as vervet monkeys (*Cercopithecus aethiops*) in Africa. Young roadrunners are eaten by dogs, cats and raccoons (*Procyon lotor*), and these sometimes catch the incubating adults on the nest. Anis in Central America are fed upon by large carnivorous bats, and this also suggests that cuckoos are not generally toxic to mammals, as has been supposed on occasion. Cuckoos avoid predators by their stealthy behaviour. Arboreal

species such as the Black-billed and Yellow-billed Cuckoos escape detection by aerial predators through their inconspicuous and watchful behaviour; they are easily overlooked not only by predators, but also by their most visually orientated prey. Other cuckoos take more active measures to avoid predators. Greater Roadrunners, for example, escape capture by an aerial predator by running, dodging, flashing the wings and spreading the tail, and these aspects of their behaviour may distract, confuse or intimidate the predator by making the cuckoo appear larger than it really is. Other roadrunners feign a wing injury near the nest by running from the nest, crouching on the breast, and fluttering the wings.

The nestlings of many cuckoos, in particular the Black-billed and Yellow-billed Cuckoos, the roadrunners and the coucals, excrete a foul-smelling black liquid from the cloaca when they are disturbed on the nest. This is thought to repel many casual predators. These birds are subject to heavy predation, which in the case of roadrunners may be responsible for more than half the nest losses. On the other hand, the young of several brood-parasitic cuckoos appear not to produce the black liquid, but instead they encapsulate their faeces and urine in a gelatinous faecal sac, which is removed by the foster parent. This response, however, changes with the age of the young cuckoo. In the case of the Greater Roadrunner, the young nestlings produce a faecal sac much as do small passerine birds, and the sac is removed and eaten by the parent cuckoos, whereas the older nestlings, when about to leave the nest, produce the foul liquid when disturbed by a nest predator.

Although the nest-building cuckoos take an active role in mobbing predators, and some give a wing-flap distraction display near the nest, the brood-parasitic species appear not to join these mobbing groups. Instead, they leave the defence of the young to the foster parents.

The displays given by male roadrunners towards other males near their territory boundaries differ from the displays directed towards the mate, but do have some elements in common with courtship display (see Breeding). Males call across the territory borders, giving "coo" calls and bowing the head to display the top of the crest and the brightly coloured bare skin behind the eye. If one male intrudes, the territory-owner approaches with the head lowered, the bare skin (particularly the orange skin)



The majority of the members of the Cuculidae live in forest and woodland, a great many species inhabiting tropical and subtropical evergreen forests. Many require relatively undisturbed primary forest, but some survive well in secondary growth or semi-arid scrub, and others have successfully adapted to living in mangroves and cocoa plantations. The Chestnut-bellied Malkoha flourishes in secondary growth, forest edge, mangroves and plantations in South-east Asia, where it lives in the dense crowns of the trees.

[*Phaenicophaeus sumatranus*, Kuala Selangor, Malaysia. Photo: Arnaud B. van den Berg]

fully exposed, and the tail held upright and wagging from side to side. The intruder also exposes his head colours, and the two birds move from side to side until the intruder backs down. The resident may approach in short bursts, running and dodging, and "popping" his wings. The resident female may join in defence by following the male to the territory border and giving "clack" sounds until the intruder has gone.

Voice

The calls uttered by members of this family vary from clear whistles in the case of glossy cuckoos and some of the large *Cuculus* brood-parasitic cuckoos of the Old World, to the harsh screams of the Great Spotted Cuckoo, the coos and rattles of the roadrunners, the hisses and glissandos of the anis, and the guttural sounds of the ground-cuckoos. Coucals give deep sonorous calls, often with a "water-bubbling" pattern which recalls the gurgling sound of water as it rushes from a narrow-necked bottle, with a rising "drip-drip-drip" at the end.

Cuckoos are distinctive in their vocalizations and in most cases are readily identified by their calls. This is especially the case in the Old World, where several species occur which are similar or almost identical in plumage and general appearance. The calls of some species are amongst the most emblematic sounds of their particular environments, as is the case of the Common Koel, the Common and Diederik Cuckoos, and the American Striped Cuckoo.

Cuckoos use their voices to announce their territories and to call to their mates. Most variations of calls are given by males when demonstrating their attendance in the territory. Quiet in the non-breeding season, the cuckoos call repeatedly and often all day long during the breeding season, when their calls are used in their territorial behaviour and in courtship. One call that is associated with courtship behaviour is the "Caterpillar Call" of the male African Diederik Cuckoo: when the male finds a caterpillar, he uses this call to attract a female, before feeding the larva to her. Female cuckoos may also utter a short version of the male's call, as is the case with the New World Yellow-billed Cuckoo, and cuckoos often call back and forth with their mates while they are on the nest. Females of the Old World brood-

parasitic cuckoos of the genus *Cuculus* emit a bubbling or chattering call quite unlike the male's calls; they do not have the loud persistent songs of the males.

The New World ground-cuckoos, including the roadrunners, and the Old World ground-cuckoos also signal with bill-pops, bill-clicks and chatters, particularly in aggressive contexts. Among group-living anis and Guira Cuckoos, communal defence of the territory against other groups involves harsh vocal calls. Guira Cuckoos are said also to imitate the sounds of other bird species, although this has not been shown in experimental studies or with field recordings which could be analysed to compare the similarity of calls of cuckoos and others. Moreover, no cuckoos are known to learn their vocalizations.

Among the cuckoos, vocal repertoires consisting of more than a single song are best known in the Greater Roadrunner. This species has several distinct calls, and these are used in different situations. The most commonly heard call is a "coo". This is a low-pitched hoot like that of a dove or an owl, and is a downward slur, given in a series of about five notes, "coo-coo-coo-coo-coo", by a male as he perches on a post or another elevated site. As the male calls, he lowers his head with the crest erect and the bare skin behind the eye exposed, and moves the bill away from the body with each note. The call is loud and can be heard at a distance of up to 250 m. The second type of call, a short "coo" is given in series of two notes, and is not so loud, being audible to about 30 m; this too is given by the male. The third, a single "coo" is a soft note heard only up to 2 m away and is given by both sexes, during a Flick-bow display in courtship. The fourth, a "bark", is a rapid series of short notes which sound like coyote (*Canis latrans*) yelps; this loud call carries for up to 300 m. It is given by the female, often with the crest raised and the bare skin exposed. Fifth, the "growl-coo", is 3-4 notes of low frequency, given by both sexes. As the bird calls, it distends its throat, fluffs its feathers, raises the crest and usually conceals the bare skin. The sixth, a "whirr", is a soft, low-pitched sound which is regularly interspersed between a series of "put-put" calls, heard up to 2 m away. The male gives the call during a tail-wag display in courtship. Finally, seventh, the "whine" is a single low-pitched call audible up to about 5 m away; it is given by both sexes. The bird shakes its head from side to side as it moves the head downward.

A number of cuckoos, among them the Sirkeer Malkoha of India, may be found in more open habitats. This species inhabits rather sparsely timbered, dry deciduous secondary forest, scrub and bush, usually with a good ground layer of lantana and thick grass. It appears to have a special preference for areas of thorn and grass jungle, and is often found on dry stony hillsides.

[*Phaenicophaeus leschenaultii infuscata*, Bharatpur, Rajasthan, India.

Photo: Roger Tidman/FLPA]



Of these calls, the "coo" series is the one most akin to the long-distance territorial song of songbirds. It is given loudly by the male, from a conspicuous perch, and the male may call for a couple of hours, beginning at sunrise. The male often remains on a single songpost, but sometimes calls from more than one perch site. Finally, males on neighbouring territories alternate their calls during the early morning.

In addition to these vocal sounds, roadrunners rattle their mandibles together in a "clack" while at the same time producing a vocal whine in the syrinx, and the male makes a "pop" by bringing his wings together inwards towards the body. During pair formation, the "coo" and the "bark" are usually given when birds forage apart, and the "growl", "coo" and "whine" when they forage together, as would be expected from the different distances at which these calls are audible in the field. The birds tend to become quiet while they are rearing the nestlings, and become more vocal when they have fledglings.

In the breeding season, many cuckoos call both during the day and at night. These include the nesting species, such as the Black-billed Cuckoo in North America, and several species of brood-parasitic cuckoos in the Old World. In tropical regions, the cuckoos, like doves, often call persistently in the hot middle part of the day, a period when most birds are quiet. They also call particularly when rain is approaching or has just passed, and this behaviour has led to the cuckoos in several continents, including coucals in the Old World, being known as "rain birds". "Brain-fever" cuckoos are named for their persistent calls, this appellation being applied to the Pallid Cuckoo of Australia and to the Plaintive Cuckoo, the Brush Cuckoo and the Large Hawk-cuckoo of Asia. The name "brain-fever" was used for cuckoos in India and Burma because they called all night, and one administrator in Uganda was petitioned to send his collectors to remove these birds as they disturbed the residents' sleep. Some cuckoos, including the Asian hawk-cuckoos and the Plaintive Cuckoo, in fact appear to utter or scream out "brain-fever!" Night sounds are not limited to the brood parasites, but are heard also from the New World nesting species, including the Black-billed and Yellow-billed Cuckoos.

The songs and calls uttered by a species of cuckoo are remarkably similar throughout that species' geographical range. The familiar "cúck-oo" song of the Common Cuckoo, for exam-

ple, is a standard from Britain eastwards through the entire Palearctic to as far as Japan, allowing, of course, for individual birds that sound out of tune near the end of the breeding season, and earlier lore that the songs changed with the season. The African Cuckoo sounds the same over thousands of kilometres, from Gambia and Nigeria through to Zambia and South Africa, as do the Diederik and Klaas's Cuckoos (*Chrysococcyx klaas*) each over its own range through the same region of Africa. All the Shining Bronze-cuckoos (*Chrysococcyx lucidus*) over that species' extensive range from Western Australia through south-eastern Australia to New Zealand are also alike in their whistled songs. These cases indicate that cuckoo songs are determined genetically and develop without the chance of learning any local variations on the species' theme.

That the standard songs of a species occur over a wide geographical range appears to be true for the majority of cuckoos, both the brood-parasitic species and also many nest-building cuckoos. These songs appear to develop innately, and this is suggested by direct observations of the Greater Roadrunner. Hand-reared roadrunners make few calls when young, and the lack of opportunity of hearing their own species' calls does not appear to affect the repertoire of these hand-reared captives, because their adult repertoire appears the same as that of wild adults.

Because a species' songs are so similar across its entire range, as demonstrated by species which are sufficiently well known, song can be utilized as a major guide to the species themselves. It can be used as a tool not only to identify a species of cuckoo in the field, but also to determine the biological limits of species where the populations differ in appearance from place to place (see Systematics).

Food and Feeding

The cuckoos are mainly insectivorous, and are specialists on caterpillars. They feed especially on the noxious, brightly coloured and hairy forms of caterpillar, regularly consuming these and other insects that are noxious to, or are otherwise avoided by, most other insectivorous birds. Yellow-billed Cuckoos, for example, include in their diet gypsy moth (*Lymantria dispar*) caterpillars, tent (*Malacosoma*) caterpillars and *Io* moth larvae. They



Despite their frequently unobtrusive life styles, some cuckoos can at times be conspicuous. This is particularly so when they sing from an exposed perch, a habit frequently indulged in by the otherwise somewhat shy American Striped Cuckoo. This species inhabits scrub, open country with scattered trees and other vegetation, and woodland clearings, and may at times be seen dust-bathing along the sides of roads. Its preference for more open areas has allowed it to expand its range in some parts of Central and South America, where deforestation has created suitable new habitat for this solitary cuckoo.

[*Tapera naevia naevia*, Ecuador.
Photo: W. S. Clark/FLPA]

take these in great numbers, and their stomachs are often packed with a felt lining of caterpillar hairs. Cuckoos also take grasshoppers and locusts, many of which have a distasteful "tobacco" juice, while others have projecting hard legs and shields which the birds remove before swallowing the rest.

As well as being specialists on caterpillars, cuckoos are also generalized predators. Forest cuckoos take large insects such as cicadas and locusts, along with other large arthropods including millipedes, centipedes, spiders, and phalangids, while a few species eat tree-frogs and others take terrestrial snails. The brood-parasitic species not only lay in the nests of their hosts but also prey on the latter's eggs and nestlings. Some other cuckoos are also predators on bird nests; the coucals, in particular, take birds from nests when they find them. A few specialize on lizards, namely the lizard-cuckoos of the genus *Saurothera* that live on islands in the Caribbean where there are few hawks and no lizard-eating hawks. In continental North America, roadrunners take lizards and snakes, as well as mice, small birds and large insects.

There are a few Old World cuckoos that are vegetarians, feeding mainly on fruit. These include three parasitic species, the Dwarf Koel (*Microdynamis parva*), the Common Koel and the Channel-billed Cuckoo, and two couacs; the couacs also take gum exuding from *Acacia* trees. However, no cuckoo appears to depend entirely on fruit, although fruits, especially figs but also berries, tamarinds and oil palm fruits, are the staple fare of the brood-parasitic Common Koel and Channel-billed Cuckoo. These cuckoos, when adults, also include some insects and other animal food in their diet. The young are often fed insects, though nestling Common Koels reared by Figbirds (*Sphecotheres viridis*) receive fruit as well as insects in their diet, and young Channel-billed Cuckoos are fed fruit by the frugivorous Pied Currawong (*Strepera graculina*). Some coucals and the Old World ground-cuckoos, as well as other species, including the roadrunners and the Yellow-billed Cuckoo, also take some fruit. Indeed, Old World ground-cuckoos are sometimes known as "fruit-cuckoos".

Most arboreal cuckoos hunt by ambush, and a bird may remain motionless for many minutes as it peers about from a perch. When it sights a caterpillar on the underside of a leaf or on a tree trunk, it dashes or flies towards it, grabs the insect, and returns to the perch to eat it. This feeding behaviour can be described as a tactic of "peer and pounce". Because caterpillars have guts filled

with indigestible and toxic leaf products, the cuckoos clean the caterpillars before eating them. The cuckoo often bites off the end, wipes the caterpillar back and forth on a branch until the guts are squashed out, or passes it back and forth through the bill to clean the insides, and then swallows the insect. Some hairy caterpillars are beaten repeatedly against a branch, the main purpose of this action being to remove the gut contents, as the caterpillars are often eaten with many hairs intact. The hairs form a felted mat in the stomach of the cuckoo, and are later regurgitated in a pellet.

Cuckoos in North America are particularly attracted to feed on tent caterpillars, which build communal tents of silk. Black-billed and Yellow-billed Cuckoos, along with orioles (Icteridae) and some 60 or more other insectivorous bird species, are drawn to wooded areas where the caterpillar tents hang on hawthorns, wild cherries and other rosaceous trees and shrubs; the tent caterpillars are also major defoliators of aspen, sugar maple, black gum and swamp tupelo and have a significant impact on these trees, which are economically important. Between bouts of foraging the caterpillars remain inside the silk tent, and the layers of silk act like a greenhouse, providing warmth by trapping solar radiation and also preventing convective heat loss from the wind. The tents are important in cool weather, and tent caterpillars are among the earliest of spring-feeding insects, when they forage by following the chemical trails laid down by other caterpillars from the tent to the foraging site, although they also search for food independently; a caterpillar forages from its tent several times a day. Although the tent provides some physical protection, insectivorous birds are able to pierce it and remove the larvae, and they also feed on caterpillars as they move along their foraging tracks. Tent caterpillars are brightly coloured and gregarious, and most caterpillars with these traits are associated with noxious taste and are avoided by many birds. Nevertheless, the cuckoos eat them, and in huge quantities.

Cuckoos often nest in areas that offer an abundant food supply. In eastern North America, this normally involves an abundance of the caterpillar species *Malacosoma americanum* in spring, from May to June, and of another species, *M. disstria*, into autumn; these two common species also overlap in their seasons. Moreover, the clutch size of the Black-billed Cuckoo appears to vary with the abundance of the caterpillars. Tent cat-



While cuckoos in general are solitary birds, their presence often revealed only by their distinctive and characteristic calls emanating from the forest depths, several species are gregarious and colonial and can be seen in groups throughout the year. The latter are typified by the four members of the Crotophaginae of the New World. These are all group-living, nest-building cuckoos which defend their territories communally against other groups of their own species, often with harsh calls. They are highly social birds, as suggested by these Guira Cuckoos and Smooth-billed Anis. They perch and roost in contact, pressed against each other, and, uniquely among cuckoos, they indulge in allopreening.

Guira Cuckoos feed on the ground in flocks of up to 20 individuals, and in the air are elegant and graceful birds. The anis, on the other hand, are awkward and clumsy in their movement, appearing to find flight difficult, and moving with a jerky and fluttering action as they progress through the vegetation. Many cuckoos, but particularly the anis, suffer from plumage-wetting caused by feeding in wet vegetation, in which they use their bill to separate the dense strands as they forage.

Following a bout of feeding, they spread the wings and tail and fluff up their feathers to dry them in the sun. The anis also adapt to cool conditions at night by lowering their body temperature a few degrees in a mild nocturnal torpidity.



[Above: *Guira guira*, northern Pantanal, Brazil. Photo: Eric Soder/NHPA.

Below: *Crotophaga ani*. Photo: F. Koster/ Survival Anglia/ Oxford Scientific Films]



In the cool, damp conditions in which many coucals live, their plumage frequently becomes wet. To counter this, they often warm and dry the body in the sun before feeding. In the early hours of the morning, or immediately after a rain shower, they will sit on a high, open perch, with the back feathers raised to expose the skin, and the wings and tail spread, absorbing heat from the sun in a classic sunning posture. Sunning is very common in some groups including the coucals; indeed, it is at such times that many, such as the Pheasant Coucal, are most easily observed.

[*Centropus phasianinus melanurus*, Kakadu National Park, Northern Territory, Australia. Photo: Peter Cook/Auscape]

erpillars commonly completely defoliate the tree in which they occur, and then move on to another tree. A tree that has been defoliated often has a second or even a third set of leaves in a season, but the growth of the tree is affected by the defoliation. In regions which suffer outbreaks of caterpillars in any one year, these "plagues" typically persist for several years: the mean duration of outbreaks in the northern states is about six years, whereas in southern states the forests are known to be defoliated annually for 20-30 years, and this pattern of abundance may influence the seasonal appearance of the breeding cuckoos.

A single cuckoo has been found to have over 100 tent caterpillars in its stomach, and over a few days one individual can remove hundreds of caterpillars, while cuckoos can eliminate entire colonies of these larvae. Despite this, it is unlikely that cuckoos have a significant effect in controlling the caterpillar numbers. On economically important stands of trees, they are more often controlled by humans through the application of pesticides and by the use of bacteria and viruses as biological control agents.

The malkohas feed by moving through the vines and branches of tropical forests and thickets with hops, balancing by twisting the tail like a squirrel, then turning and seizing an insect spotted on a leaf or axil. The single African species, the Yellowbill (*Ceuthmochares aereus*), is often accompanied by other insectivorous birds and by squirrels; the attendant birds appear to use each other as beaters, a bird grabbing the insects as they are flushed by the mixed flock.

The coucals are generalist predators and take many large insects and small vertebrates, including snakes, lizards, tree-frogs, mice and rats, and small birds. Coucals feed mainly on the ground, often in thick scrub, but also, less commonly, in tangles of vines and on the branches of trees. They are slow and clumsy in their movements, but move rapidly when they locate their prey. When capturing grasshoppers and lizards on the ground, they move forwards with a slow stalking walk, and then, when they are close, they change to a hop and run, and either ambush or chase the prey. Their feeding behaviour is one of "flush and rush". At other times, they tear open bird nests to obtain the eggs and young, and rip bark from trees to reach the lizards and large insects that are concealed behind it. Coucals are recognized as predators by small birds, which mob them. In marsh and swamp habitats they

feed partly in the water, where they take frogs, crabs and aquatic insects, and they occasionally scavenge for dead fish. Those coucals living in seasonally dry habitats are quick to respond when the grasslands are ravaged by fires during the dry season. Like foraging Cattle Egrets (*Bubulcus ibis*), White-browed Coucals (*Centropus superciliosus*) approach the smoke and feed at the edge of the grass fires, taking large insects and small mammals that attempt to escape the flames as the fire advances.

Anis are mainly ground feeders. Groove-billed Anis (*Crotophaga sulcirostris*) and Guira Cuckoos forage most commonly in meadows and pastures in dry open habitats, Smooth-billed Anis (*Crotophaga ani*) also feed in denser herbs in wetter habitats, while Greater Anis (*Crotophaga major*) prefer wet forest edges. The largest bill size is found in the species that live in habitats with larger and wetter leaves; these cuckoos use the bill as a wedge when moving through leaves and when feeding. Dry-country forms take grasshoppers and follow cattle, much as do the icterid cowbirds (*Molothrus*), and, like some cowbirds, the anis may also take ticks from the backs of the cattle, whence their Spanish name, *garrapatero*. Hard-bodied insects are bitten repeatedly before they are swallowed or fed to the young. Members of a social group of anis forage near each other, and, although they may be out of sight in the grass, they stay in contact with much squeaky calling. When a predator comes into view, the anis call and fly up together to higher perches. Their group behaviour is therefore related not only to attraction to an abundant source of food, when birds flush insects which others capture, but also to mutual protection from predators. When feeding in company with a cow or a horse, anis hop along near the front of the mammal and seize the insects stirred up in the grass. As might be expected, they catch more insects per minute when feeding with cattle than when hunting alone, especially in the dry season. Anis also use army-ant swarms as beaters, and catch the roaches and other insects driven from the ground litter by the hunting ants.

As in many other aspects of cuckoo biology, it is the roadrunners that have received the most detailed study, partly because they feed on the ground in open areas and are generally more visible than their arboreal cousins as they stand and scan. The best known cuckoos may be atypical of the family, but their feeding habits are nevertheless fascinating. A bird will move on

Cuckoo vocalizations are highly distinctive, and many species are instantly recognizable by voice. This is particularly important in the Old World, where some species are almost indistinguishable in the field except by their calls, and these vocal differences have been used to define taxonomic boundaries between such species. Cuckoos are generally quiet for most of the year, but call persistently throughout the day during the breeding season in territorial behaviour and in courtship. One of the best known natural sounds in Eurasia is the repeated call of the Common Cuckoo as it announces its territory and calls to its mate.

[*Cuculus canorus canorus*,
Catalunya, Spain.
Photo: Oriol Alamany]



foot across the desert floor, alternating walking and running with periods of standing and scanning. It may also flush prey as it walks in tall grass, where it finds insects by walking with the head low and brushing the grass; this startles the insects, and when they jump the roadrunner grabs them. In another method used to flush insects from grass, the bird jumps up and flaps its wings slowly over the ground; it then catches the insect on the wing, or watches where it lands and picks it from the vegetation. These terrestrial cuckoos also dart into clumps of vegetation and take large insects such as grasshoppers and crickets, spiders as large as tarantulas, and scorpions, and any small vertebrates they can catch such as small snakes, mice and small birds, as well as the contents of bird nests. They are able to run down lizards in hot pursuit. In addition to running after prey on the ground, roadrunners sometimes leap at flying insects and even flying birds such as swifts (Apodidae) over a dry streambed, and they ambush nectar-feeding hummingbirds (Trochilidae) at their feeding places. They also take young communal bats that fall from the ceiling of a cave or fly into the walls and fall to the ground.

Roadrunners take lizards and snakes in highest numbers in the breeding season. Two birds in a pair may co-operate in attacking a large snake, circling it and alternating their attacks. Beetles and grasshoppers are an important part of their diet in winter, when they seek out insects that are concentrated around the base of rocks; when insects and reptiles are scarce in this cold season, the birds also feed on small birds, fruits and seeds and scattered grain. Roadrunners take fruit such as the sweet seedy fruit of the prickly pear (*Opuntia*) cactus, knocking it to the ground and tumbling it to remove the spiny cover. Fruit can total about 10% of their diet.

By following a hand-reared free-living adult roadrunner, a secondary-school student was able to observe the food items that the bird took on its foraging expeditions through the Texas brush. Its food comprised 263 hopping grasshoppers and 73 flying grasshoppers, 17 scorpions, 28 sowbugs, 7 caterpillars, 3 chrysalids, 14 angleworms, 39 moths, 1 butterfly, 14 centipedes, 2 tarantulas, 16 other spiders, 3 stick insects, 3 small toads, 3 horned lizards, 14 other lizards and a mouse.

Although roadrunners are popularly thought to have a special taste for poisonous snakes, they do not seem to search out rattlesnakes. Nevertheless, when a bird encounters a snake that

is not too long, generally no longer than itself, such as a sidewinder rattlesnake (*Crotalus cerastes*), it may kill and eat it. In attacking the snake, the bird crouches and circles around it, and then darts in to grab the rattlesnake just behind its head with the bill. Holding the head in the bill, the roadrunner whips and pounds the snake against the ground or stones until it no longer moves. Once the victim is dead, it pulls it into the shade of a shrub and eats it.

This behaviour is not reserved for rattlesnakes alone, as roadrunners also toss and batter other snakes and lizards to kill them. When capturing prey, they grasp the victim in the bill and then treat it according to the kind of food it happens to be. Birds are plucked of their feathers, small mammals are killed by a blow to the base of the skull, and larger prey such as lizards, snakes and ground squirrels are held in the bill and then swung and hit again and again against a rock, a stick or the ground. This beating not only kills the prey, but it also separates and crushes the skeleton and thereby reduces it to a narrower form, allowing the bird to swallow its large prey whole; this processing of prey may take up to 15 minutes. Roadrunners kill scorpions by biting at the tail where the poison gland and sting are located; this removes the stinger and prevents the risk of the bird being stung. Roadrunners swallow their prey head first, and in this way avoid the backward-pointing spines and scales of the lizards and snakes.

In the interior of forests in tropical America, the ground-cuckoos follow swarms of army ants, using the ants as beaters to flush insects. The cuckoo appears to wait until an ant swarm enters its territory, whereupon it follows the swarm as it passes through. As the ants move along the forest floor and insects scatter in their advance, the cuckoo waits on the ground or perches on low horizontal branches near the ground. On the ground, it then runs at the edge of the swarm, snaps up an insect or other forest-floor arthropod, and runs away in active bounding movements, changing directions, or it spins away; only occasionally does it flap, to get over a vine or to gain an elevated perch, but extended flight is uncommon. These cuckoos feed separately, usually with only one individual at an ant swarm, and they continue on their separate ways. When they find themselves too close together, however, the cuckoos rush at each other with rapid bill-pops, or they lower the primaries and spread the tail in aggressive behaviour, and then one leaves the swarm. While not in



attendance at an ant swarm, ground-cuckoos wander through the forest, and when they come to an ant trail they appear to recognize it; they follow the trail until it leads to the swarm, and thereby to a source of food. Like roadrunners, the ground-cuckoos, when watched over a lengthy period, become tame enough for an observer to follow them. They are the largest birds in the forest which attend these army-ant swarms, where they appear regularly along with numerous other kinds of birds.

Breeding

Within the Cuculidae there is a remarkable diversity of breeding styles: the variability of the cuckoos in their social behaviour and parental care may be unmatched among the birds of the world. The brood-parasitic cuckoos lay their eggs in the nests of other species and never raise their own young; since two species breed in Europe, where they have been observed for many centuries, their natural history is well known. There is considerable diversity among the brood parasites, with 50 species in the Old World and three others in the New World. On the other hand, four cuckoos in the New World are group-living birds, in which more than one pair or more than one female regularly lay their eggs in a single nest that is attended by several adults; these are the co-operative breeders.

The Old World brood-parasitic cuckoos lay their eggs in the nests of a wide variety of passerine species. Their eggs vary from blue and green to dark chocolate brown to white, and are either spotted or unspotted; many species have more than one form of egg marked by a different colour and pattern. The nestlings are naked when they hatch, though young Shining Bronze-cuckoos in New Zealand have dense down, in contrast to the naked nestlings of the same species in Western Australia. The inside of the mouth lacks special visual marks except for a healthy colour of red, orange or yellow.

Nevertheless, despite the notoriety of the brood parasites, most species of cuckoo live in pairs and regularly raise their own young, while rarely these same species lay their eggs in the nest of a neigh-

bouring pair of their own species or of another species of cuckoo. In addition, while cuckoos do usually breed in pairs, polyandry is also known to occur sometimes in at least one species.

Those cuckoo species that nest show a fair degree of variety in the form of their nests, while the markings inside the mouths of chicks can be of considerable interest. The malkohas build shallow nests in trees, lay chalky white eggs and rear their own young. Their nestlings have conspicuous spots on their mouth palate, and, similarly, the palate of young couas has a conspicuous visual pattern of raised spots that contrasts with the lining of the mouth. The nests of the Asian ground-cuckoos resemble those of the malkohas; in the Coral-billed Ground-cuckoo (*Carpococcyx renauldi*), the only one of these species for which anything approaching adequate data have been collected, the young have white markings on their red palates, and are raised by the adults.

Coucals build large globular or domed nests of grass and leaves with a side entrance. Their nestlings initially have a curious hair-like covering of stiff down, and as the body feathers grow these hair-like structures remain attached to the tips of the growing feathers; they then fall off shortly after the birds fledge. The nestlings also have conspicuous and sometimes species-specific raised and coloured spots on the palate.

The New World Coccyzinae build saucer-shaped nests in trees, and lay either white or blue eggs. The young, where known, have raised papillae on the inside of the mouth, the colour of which contrasts with the colour of the soft palate.

The anis and the Guira Cuckoo often live in aggressive and noisy social groups, in which several pairs defend a common territory and share a communal nest, with two or more females laying their eggs. The nest is flat or a shallow bowl, built in a tree. The mouth of the nestling is pink, with white marks on the roof and around the tongue.

The New World ground-cuckoos vary in their breeding behaviour. Most build a shallow bowl of a nest and rear their own young, but the group includes three brood-parasitic species. At least some nesting species have nestlings with conspicuously coloured spots inside the mouth. The brood-parasitic Pheasant Cuckoo (*Dromococcyx phasianellus*), Pavonine Cuckoo (*Dromococcyx pavoninus*) and American Striped Cuckoo use several species of host, but most typically passerines with covered, domed nests.

All young cuckoos are altricial in their development. They remain in the nest while they grow, they depend on their parents or on other host species to provide food, and they grow rapidly. Nestlings of the species that rear their own young, including the Dwarf Cuckoo (*Coccyzus pumilus*), the Black-billed and Yellow-billed Cuckoos, the Squirrel Cuckoo, and the Smooth-billed and Groove-billed Anis, leave the nest in as little as ten days; they can climb about when they are disturbed, and fledge even before then. The larger species of ground-dwelling cuckoo, including the Coral-billed Ground-cuckoo, the African Black, White-browed and Pheasant Coucals and the Greater Roadrunner, fledge in 17-20 days. In contrast to these species that care for their own young, nestlings of the brood-parasitic cuckoos, such as the Jacobin and Common Cuckoos, Horsfield's Bronze-cuckoo (*Chrysococcyx basalis*), the Shining Cuckoo and the American Striped Cuckoo, take 18-20 days to fledge; the larger Great Spotted Cuckoo takes 22-26 days; and the largest of these species, the Channel-billed Cuckoo, takes 17-24 days to fledge. The nestling period of the brood-parasitic cuckoos is twice as long as that of the nesting cuckoos of the same body size, and the chicks monopolize the parental care of their foster parents for a few more weeks after they fledge.

Most of the nesting cuckoos are socially monogamous, with one male and one female living together in a social pairing, and both sexes raise the young. Even the co-operatively breeding anis appear to maintain distinct social pairs of a single male and a single female. The mating systems of the brood-parasitic cuckoos are not so well known: there appear to be no strong pair-bonds between the sexes in most species, although in some crested cuckoos, especially the Jacobin Cuckoo, the male and female appear to act together, the male drawing the host off the nest while the female slips onto it to lay her egg.

The calls uttered by the Cuculidae vary according to genus. Many species produce clear whistles, some utter harsh screams, while others give coos, rattles, hisses and guttural sounds. Among the most interesting are the deep calls of the coucals, often with a gurgling sound like water being poured from a bottle, with a rising "drip-drip-drip" at the end. Many of the vernacular names given to cuckoos are onomatopoeic, among them the couas, which emit deep cooing sounds. The Giant Coua calls from the ground or low in a tree, giving a deep "wok wok wok...", a guttural "ayoo-ew", short grunts, and a resonant "kookookookoogogo".

[*Coua gigas*, Berenty, Madagascar. Photo: Josep del Hoyo]

A few cuckoos have a polyandrous mating system, in which the female mates with more than one male in a season. In some cases, the male takes a more active and conspicuous role than the female in incubation and care of the young, and on the basis of the roles of the sexes in parental care the coucals are assumed to be polyandrous when a female is able to attract more than one male.

Polyandry is best known in the African Black Coucal, from work carried out in Zimbabwe. One female observed had only one male, but another female had three males and mated with each one in turn, while each male held a separate territory within her large territory. In this latter instance, the males built the nests, the female laid her eggs, and each male then incubated the eggs on the nest in his territory and brooded and fed the young; the female took no active role in the care of the young. Only two females were observed, and only one of them had more than one mate. Additional fieldwork is called for on the mating systems not only of these coucals, but also of other species, especially those with marked sexual size dimorphism in which the female is larger than the male. It must be emphasized that at present the idea that polyandry occurs in coucals is based mainly on indirect deduction from the larger size of the females, but there may be other reasons for their reversed sexual size dimorphism. For example, in many monogamous raptors, including falcons and owls, the females are larger than the males, and the hypotheses to explain this reversed sexual size dimorphism include a specialization by the sexes on different foods in a territory and a social dominance by the female over the male around the nest.

The breeding biology of coucals, for instance the Pheasant Coucal, is atypical of many tropical altricial landbirds. These coucals lay large clutches, they have a short nesting cycle, the nestlings grow rapidly, and the juveniles mature early; actually, these last three traits occur in some other tropical-nesting cuckoos. Their breeding success is high. They add green leaves to the nest before laying, and continue to do so through the incubation period; it has been suggested that these leaves might have some sort of a medicinal effect. Nestling coucals have curious hair-like down which is formed by an elongated keratinized feather sheath. They also have prominent marks and papillae on the palate, and sometimes these are in contrasting colours. The young have a prominent egg-tooth, as in other cuckoos, and they emit a

foul-smelling liquid excretion from the cloaca when they are disturbed in the nest.

The majority of cuckoos living in tropical and subtropical regions breed in the rainy season. In equatorial East Africa, the breeding season coincides with that of local rainfall, where the difference in timing between regions only 200 km apart may be several months. At higher latitudes, in more temperate areas, the cuckoos are seasonal and breed in spring with the rains and warmer weather. The breeding season for the brood-parasitic cuckoos in both areas corresponds with that of their host species, which in turn depend on insect food to rear their young. Nearly all of the nest-building cuckoos also feed mainly on insects, or on other arthropods, or, in the case of the African Yellowbill, on small vertebrates such as tree-frogs, and their breeding is determined by the period when their food is abundant. The North American Black-billed and Yellow-billed Cuckoos have particularly long seasons, beginning at the same time as the earliest-nesting insect-eating songbirds, in April and May, but continuing into August and early September in areas where insects are abundant, in particular in areas with outbreaks of tent caterpillars, which feed in huge numbers on many wild trees and shrubs (see Food and Feeding).

For Greater Roadrunners, the breeding season varies regionally, depending on seasonal temperature and rainfall. In southern California, it breeds from late February at low elevations of the Lower Sonoran Life Zone, and a month later in upland deserts of the Upper Sonoran Life Zone. The fact that both parents contribute in the nesting tasks allows them to raise more than one brood in quick succession. A pair of roadrunners in California can make a second nesting attempt a month after the first, when the male takes over the care of the fledglings while the female lays a second clutch of eggs. In southern Arizona, breeding tends to be bimodal, with nests from mid-April to mid-June and from late July to mid-September, with a pause in the hot dry summer and increased nesting activity after summer rains; breeding peaks may vary with the rains of the year. In Texas the roadrunners breed from March to October, and in Oklahoma they breed from April to July or August.

Breeding displays are known for only a few species of cuckoo. The features shown by two of these may be instructive for the general patterns of display behaviour in the group as a

Although they do take a reasonable variety of other foods, cuckoos, such as this Shining Bronze-cuckoo, are mainly insectivores, specialized on caterpillars. They have a predilection for brightly coloured, hairy types of caterpillar, which, being noxious, are avoided by most other insect-eating birds. The cuckoo peers around for a likely insect, then dashes towards it and makes a quick grab, before returning to its perch. Before swallowing the caterpillar, the cuckoo usually beats it against a branch or passes it several times between its mandibles to remove the gut contents.



[*Chrysococcyx lucidus*
lucidus,

Lamington National Park,
south-east Queensland,
Australia.

Photo: Glen Threlfo/
Auscape]



In addition to the many caterpillars in their diet, cuckoos also take numerous grasshoppers and crickets. Many of these insects have a bitter, tobacco-like taste, and others possess a hard protective shield or hard projecting legs which the cuckoo removes before consumption. Unlike most arboreal cuckoos, which remain motionless while scanning for prey, malkohas, like this male Chestnut-breasted Malkoha, will hop through the branches and tangles of their tropical-forest habitats and seize any suitable insect which they come across.

[*Phaenicophaeus curvirostris singularis*, Taman Negara National Park, Malaysia. Photo: Chew Yen Fook]

whole, even though it is difficult to judge just what extent of extrapolation is reasonable. The two best known species are the Greater Roadrunner of North America and the Common Cuckoo of the Palearctic.

In Greater Roadrunners, the male and the female spend time foraging together and calling back and forth before they show an apparent sexual interest in each other. Early in courtship, one bird runs after the other along the ground, often for several hours, the two frequently stopping and resting between chases. The chasing bird runs and lunges at the one in front with its wings and tail raised and fanned, while both birds give "clack" calls. The male intermittently utters a "coo" call from an elevated perch. One bird carries a stick in its bill and presents this to its mate; both sexes take part in this activity, picking up sticks and passing them to the mate or dropping the stick at the mate's feet. This behaviour appears to precede nest-building and may provide a bird with an assessment of the potential breeding performance of its partner.

Before they copulate, the roadrunners perform a "Prance Display". The male approaches the female on the ground in short, quick bursts of speed, holds a food offering in his bill, and wags his tail back and forth. He runs to and from his mate with his wings and tail lifted, then he lowers the wings and brings them inward with a "pop". During this display, he holds his tail over his body and then gradually lowers it; he exposes the postorbital bare skin, erects the crest, and sleeks the contour feathers. The display involves four or five cycles of wing-lifting, and altogether the behaviour lasts for more than two minutes. In a "Tail-wag Display", the male wags his tail from side to side, while he bows and then slowly lifts his head, as he faces the female and gives a "whirr" call. After this, he jumps into the air and leaps over the female or mounts her from the rear. He holds the food in his bill and presents it to the female as the two copulate. The male then dismounts, and the two walk away from each other, flicking their tails. The female eats the offered food, or feeds it to her young if the copulation occurs after the young have hatched: roadrunners copulate socially, and not only for the purposes of fertilization.

In the Common Cuckoo, either sex may begin the active courtship. The female gives a bubbling call and the male approaches; or the female approaches a calling male. The male

then bobs his head, or bows his body, holding the wings open and drooped and the tail raised and fanned; in the fan posture, the male may rotate his body slowly and sway from side to side. The female looks on. The male may on rare occasions present a caterpillar to the female. When mating, the male follows the female silently, and may present a piece of vegetation to her. The female opens her wings slightly, moves her tail to one side, and calls just before mating; the male mounts her, then droops his wings slightly and moves the unfanned tail slowly from side to side. Copulation occurs 1-1½ days before laying the egg, which is fertilized by this mating; it does not take place again until the egg has been laid.

Cuckoos of several species have been seen to spread and raise the tail in sexual display, fragments of this behaviour having been recorded for Old World parasitic cuckoos, the American Striped Cuckoo, the anis and the Guira Cuckoo. The bold patterns of white spots on the tail are presumably important in breeding displays of many other cuckoos which exhibit these plumage traits, such as the malkohas and the New World coccyzines.

Males sometimes feed their mates at the time when the females ovulate and copulate, and they give calls which attract the females. Mate-feeding has been seen in a few brood-parasitic cuckoos, including the Jacobin Cuckoo and several glossy cuckoos: the male catches a caterpillar, calls, and attracts a female, to which he then passes the prey. In the brood-parasitic Diederik Cuckoo, the male has a special place in his territory where he calls with a caterpillar in his bill, and attracts a series of females. When he has a caterpillar, he gives a call. The female gives another call when she attracts the male to feed her, this being especially evident in the African glossy cuckoos such as the Diederik Cuckoo, where the female "Caterpillar Call", transcribed as "deah-deah-deah...", reveals the presence of the courtship-feeding pair. Females which accept this transfer of a caterpillar are often in the act of releasing the ovarian follicle into the oviduct, and this is the time when copulation may be most effective in bringing about fertilization.

The phenomenon of brood parasitism, often associated with cuckoos in the minds of many, is of particular interest. The brood-parasitic cuckoos lay their eggs in the nests of other species, their hosts. The individuals that rear the young cuckoos are the foster

Roadrunners are essentially ground-foraging cuckoos.

They take a wide variety of prey types, both invertebrate and vertebrate, and ranging from very small to quite sizeable items. In winter, beetles and grasshoppers form a major component of their diet but, if insects and reptiles are scarce, they also eat small birds, fruits and seeds, including the sweet seedy fruit of the prickly pear cactus; fruit can even constitute as much as 10% of their winter diet. Reptiles are consumed in greater numbers during the breeding season.

Despite popular belief, roadrunners do not appear to have any special preference for poisonous snakes, although, as this photograph demonstrates, they will certainly kill and consume any rattlesnakes which they come across.

In attacking a snake or large lizard, the Greater Roadrunner crouches and circles around it, darts in and grabs the victim behind the head with its bill, and then batters it against a hard surface until it ceases to struggle. This beating and battering process, which may last for up to 15 minutes, has the additional advantage that it crushes the prey's skeleton and reduces it to a narrower shape, making it easier to swallow whole. A pair of roadrunners may join forces to attack a large snake, circling it and alternating their attacks. These terrestrial cuckoos are able to outrun large lizards, which can form a significant proportion of their diet.

[*Geococcyx californianus*.
Above: Mohave Desert,
California, USA.
Photo: Jeff Foott/BBC
Natural History Unit.

Below: southern Arizona,
USA.
Photo: John Cancalosi]



parents. These fosterers incubate the cuckoo egg along with their own clutch, and when the cuckoo egg hatches they feed the young cuckoo. This leads to the loss of their own offspring, when the nestling cuckoo removes the host's eggs or nestlings.

The hosts respond to cuckoos near their nest by mobbing them, flying at them from above, hitting them and calling loudly; other species often react by joining in the mobbing. Mobbing may drive the cuckoo from the nest, and a host may thus avoid being parasitized. When a cuckoo is not near the nest, however, the mobbing behaviour of a host could help it to locate the nest. The host therefore usually restricts its mobbing to the immediate area of the nest when the cuckoo has presumably already spotted this.

A female cuckoo finds the nest of a host by watching the nest-building birds inconspicuously from a concealed perch, and by searching through the habitat of the host species. The cuckoo visits the nest, often while the nest-owner is away feeding, and lays her egg into it. With the best of timing, she deposits her egg during the laying period of the fosterer, when the latter has laid at least one egg, but before incubation has begun. Laying of the egg takes place rapidly, and has been timed at 10 seconds or less. The cuckoo then flies away from the nest, often taking an egg of the host in her bill. Sometimes she removes an egg and flies away with it, consuming it later; at other times she perches on the nest rim and swallows egg after egg. Some nests are preyed on by a female cuckoo which does not return to lay her own egg. Removal and eating of the host's eggs provides the female cuckoo with nourishment, and with minerals to help her form her own eggs later. At nests where the birds have been watched and photographed, only female cuckoos remove the eggs; males, having no need to form eggs, do not. Removing the egg also controls the total number of eggs in the nest, and this behaviour may increase the chance that the fosterer will not desert and will successfully incubate the parasitized clutch.

Occasionally, a cuckoo may remove one of the host's young from the nest, and either eat it or drop it nearby. In much the same way as when a cuckoo takes the entire clutch and the host deserts, this removal of the chick may result in the host pair nesting again, perhaps to be parasitized by the cuckoo.

The female glides from a perch to the nest-site of the host, and lays while crouched in the nest, or on the rim, or perched

above it. In nests that are enclosed or situated in a hole, the female may extrude her abdomen into the cavity and lay without completely entering the nest. It was reported in earlier years that a female cuckoo may lay her own egg elsewhere and then carry it to the host's nest in her bill, but film recordings demonstrate that the female lays in the normal manner at the nest; observations of cuckoos carrying an egg in the bill almost certainly relate to their removing an egg from the nest of a host. In 1924, a committee of field workers in Britain was appointed to solve the argument, and the lack of any reports of cuckoos depositing their eggs away from nests, together with the films available showing a normal laying procedure, indicate that in all probability cuckoos generally lay directly into the nest.

A day or two after it hatches, the nestling cuckoo moves its body under the other eggs in the nest, or under the chicks if the host's eggs have already hatched, and then pushes them from the nest. This "eviction" behaviour is known for about half of the species of parasitic cuckoo, and it has been observed in most detail in the Common Cuckoo. Because the cuckoo chick usually hatches first and removes the eggs of the host, the foster parents do not raise any of their own young from a successfully parasitized nest, but give all their parental care to the young cuckoo and rear their "changeling" as their own. Most cuckoos parasitize host species that are smaller than themselves, and the young cuckoo grows rapidly and takes all the food that would normally have been delivered to a full brood of the host's young.

The young of a few cuckoo species, such as the Common Koel, tolerate the eggs and chicks of the host, but this behaviour is unusual among cuckoos. The tolerance of these nestling cuckoos may in part be forced on them by the larger size of the host species, and is perhaps also favoured because a greater quantity of food is brought in by the larger adults intended for their larger chicks. Young Great Spotted Cuckoos in the nests of crows and Black-billed Magpies (*Pica pica*) often grow up together with their foster nest-mates, while young Great Spotted Cuckoos in the nests of smaller starlings grow at the expense of the host's young and evict them or take all the food, while their nest-mates starve.

The nestling cuckoo evicts the nest contents either within a few hours of hatching, or when it is two days old and strong enough to lift the eggs or chicks and push them from the nest.



While many cuckoos eat hairless caterpillars and a variety of other soft-bodied insects, as well as items such as fruit, they are justifiably famed for consuming vast numbers of noxious hairy caterpillars. Such cuckoos tend to be very active feeders, moving about restlessly in the canopy and also, as with the Plaintive Cuckoo, foraging in scrub and brush in search of tasty morsels. The Plaintive Cuckoo is one of a number of Old World species whose loud, almost screaming calls, heard mostly in the mornings and evenings, sound like the words "brain-fever!". It also has a softer, more plaintive piping whistle.

[*Cacomantis merulinus* querulus,
Ha Tsuen, Hong Kong,
China.
Photo: Ray Tipper]

Coucals are food generalists, their predatory habits often eliciting mobbing from other birds. They are often present around wetlands, where they readily catch aquatic insects, frogs and crabs and prowl the waterside in search of any food. Somewhat surprisingly for cuckoos, they will at times even scavenge dead fish, as demonstrated by this Greater Coucal.

[*Centropus sinensis sinensis*,
Bharatpur, Rajasthan,
India.
Photo: Belinda Wright/
DRK]



The behaviour varies with the depth of the nest cup of the host. In Australia, Horsfield's Bronze-cuckoo and the Shining Bronze-cuckoo often parasitize host species which fashion a deep cup in a covered or domed nest, and the nestling cuckoos do not begin the eviction until the second morning after they hatch. When the foster parent leaves the nest for its first feed in the early morning, the inactive nestling cuckoo becomes cool. This causes it to become more active, and it pushes itself around the nest until it comes into contact with the contents of the nest, either the host's egg or, if this has hatched, its nestling. It proceeds to lift the victim onto its back, balances its body by using a tripod of its wings and head braced against the floor of the nest, and shoves the egg up until it clears the side entrance of the nest. The foster parent, on returning, ignores the egg near the edge of the nest or fallen into the supporting bush, and it broods the cuckoo, which then becomes warm and less active. Sometimes the nestling cuckoo evicts an egg while the foster parent is actually on the nest, and the latter looks on without interfering as the cuckoo pushes the egg out from under its body and out of the nest.

Although the cuckoo nestling may destroy the eggs and nestlings of the host and cause it to fail to produce any offspring of its own, the host parents often do not discriminate against the cuckoo egg; they tolerate it, and incubate it along with their own clutch. This lack of response by the host to the egg of the cuckoo may have two different explanations. First, the hosts may lack the genetic variation that would allow evolutionary selection to favour their action against the cuckoos. Second, the hosts and their cuckoo parasites may exist in a state of equilibrium, where the gains of rejection are balanced by the costs of rejection (see below) of the parasite. A dynamic equilibrium between host and brood parasite appears to be important in the accounting of adaptations of host and parasitic cuckoo.

Many host species can recognize the eggs of a cuckoo as different from their own, and they remove or "reject" the cuckoo egg from their nest if it does not resemble their own eggs. Cuckoos, in turn, often have eggs that closely match the host's eggs in colour and pattern, and these matching or mimetic eggs are more likely to be accepted by the host and incubated along with its own eggs. Fine tuning of cuckoo egg to host egg by natural selection, however, leads to specialization: eggs that closely match those of one species of host are unlike those of another species of host in the same area. The result of this is a co-evolutionary "arms race". The host develops an ability to discriminate among eggs, and also perhaps a high degree of individual variability in its eggs, so that it can recognize the egg of another bird and reject it (this may also occur with intraspecific brood parasitism); and the cuckoo develops an egg that resembles or mimics the eggs of the host, a heritable variation within a species which a mother cuckoo can pass on to a daughter cuckoo. The nature of the inheritance of egg colour is unknown. It has been suggested

that the genetic traits for egg colour and pattern are located on the unpaired chromosome that is found only in the female (in cuckoos, as in other birds, the female is the heterogametic sex), and this maternal determination of egg colour may prevent a mismatch if a female were fertilized by a male with genes of another egg colour. Unfortunately, however, there are no observations on the genetics of egg-colour polymorphism among the cuckoos.

Eggs of parasitic cuckoos have a hard and thick shell that resists cracking when the female lays her egg from a perch above the nest, and it also resists removal by the host. The egg is laid after the embryo has developed for a day in the oviduct, and the developing egg in the host's nest is tolerant of cooling, as the embryo remains alive for a day after the clutch has been experimentally removed from the nest.

The eggs of the parasitic cuckoos are small in relation to the body size of the adult female, and are often closer in size to the eggs of the host. In contrast, the eggs of the nest-building cuckoos are not small for the size of the adult bird when compared with the situation among other types of bird, and the eggs of the co-operatively breeding anis are relatively large. The small egg size may allow a female parasitic cuckoo to lay more eggs in a season, for reasons of economy, and evidently these may also go undetected in the nest of the host if they resemble the host's eggs in size, as well as in colour and pattern. It also seems likely that this mechanism of the small egg relative to female body size may effectively shorten the period of incubation that the egg needs; without this reduction the cuckoo chick would presumably hatch several days later than the host's own chicks, which could clearly put the cuckoo's entire strategy at great risk.

A female cuckoo usually lays one egg per nest in the nests of a single species of host, often one with eggs that resemble her own. In the case of the Common Cuckoo, each female specializes on a certain species of host, and she tends to exclude other females from her laying area, although two or more types of cuckoo egg sometimes appear within an area. The young cuckoo may imprint on its foster species, and later, as an adult, return to the same habitat and find the most suitable host nests by matching the calls of its own foster parents to the calls of birds in its breeding area.

It has been suggested that a population of cuckoos consists of distinct biological "races" or "gentes" which are closely associated with their foster species. These might involve egg morphs, where a female returns to lay her eggs in nests of the same kind of host that raised her, or they might involve cryptic populations, where both males and females seek out each other. So far, nobody has been able successfully to observe an individual cuckoo from the nestling stage to a later year to determine whether a female, in an area where two or more hosts are equally numerous, seeks out as a target for parasitism the host species that raised



In a number of brood-parasitic cuckoos, including the Great Spotted Cuckoo and other members of the genus *Clamator*, the male, having attracted a mate by calling, will then offer her a caterpillar. This mate-feeding is not infrequently followed by copulation. For a number of species, it has been shown that females which accept this offering are often in the process of ovulating, and this is precisely the time when copulation is most likely to lead to successful fertilization.

[*Clamator glandarius*.
Photo: Bernt Fischer/Bios]

her, which would provide a test of the discrimination and choice of the female cuckoo. It is also unknown whether females are more likely to mate with males with the same foster history as their own. Nor have genetic studies shown differences between cuckoos which were fostered by different host species or which hatched from different colour morphs of eggs. The songs of all male cuckoos in an area appear to be rather similar, and the variation in pitch and modulation between the song given by a male when he is alone and that given when another male enters his area is greater than the variation in song among individual males. So far as is currently known, therefore, it appears that the "races" which live together in an area relate only to the females' egg colours and patterns, and do not involve the separation of exclusive breeding groups within a species of cuckoo.

Most small songbirds in Europe reject the eggs of other birds from their nest, and this appears to be an adaptation to avoid being parasitized by the Common Cuckoo. In field experiments with 34 species of songbird, an egg unlike their own (a model "cuckoo" egg) was placed in the nest: eight species rejected the odd egg on over 80% of occasions; 16 species rejected it in 20-80% of cases; and ten species rejected the strange egg in 0% to less than 20% of tests. Five of the ten species which accepted a strange egg were hole-nesting songbirds which are not parasitized by cuckoos in natural conditions, and one was a cardueline finch; such finches, because they feed seeds to their young, are not natural foster species, and young cuckoos usually do not survive on a seed diet. Acceptance or rejection of an egg is also influenced by the time when the egg is laid in the nest. Birds more often reject the egg when it appears during the period while they are laying than when it appears after they have begun to incubate their clutch.

Although some songbirds reject cuckoo eggs, others are more tolerant and accept them into their clutch, even when they do not closely match their own eggs. It seems likely that the various colours and patterns of cuckoo eggs have evolved together with the responses of certain host species that are intolerant, and that cuckoos laying these mimetic egg forms have later successfully parasitized other species that are not so discriminating. In Europe, several songbirds are parasitized by Common Cuckoos laying blue eggs, but of these hosts the Common Redstart (*Phoenicurus phoenicurus*) and the Whinchat (*Saxicola rubetra*)

are the most discriminating; the other host species, such as the Northern Wheatear (*Oenanthe oenanthe*) and the Pied Flycatcher (*Ficedula hypoleuca*), may then have been parasitized secondarily by these egg-colour lineages of cuckoos, but they do not discriminate so intensively.

In Europe, most small songbirds respond to the threat of parasitism by removing the egg of the cuckoo. In contrast, most small passerines in North America accept the eggs of the parasitic Brown-headed Cowbird (*Molothrus ater*), a member of the Icteridae. Presumably, the difference in reactions is due to the fact that the young cuckoo, when it hatches, kills the host's potential offspring by evicting its eggs before they hatch or by evicting its nestlings, whereas the cowbirds often grow up together with the nestlings of the host, although they may compete for parental care, and the fledging success of parasitized broods is less than that of unparasitized ones.

Removal of a cuckoo egg also has its costs, and this may explain some of the variation among birds in accepting an alien egg in their clutch. When a cuckoo egg is laid late or when it is sterile, there is no advantage to the host in removing it, and the same hosts that remove a cuckoo egg when it is laid along with their own clutch will also accept a cuckoo egg when it is laid well after incubation has begun. On the other hand, when the host removes an egg, it risks damaging its own eggs by spilling yolk on to them, or by dropping the cuckoo egg on to its own eggs and cracking them, or it risks removing its own egg in error. These costs would be similar for both cuckoo hosts and cowbird hosts, so the differences that remain in their behaviour point to the greater impact of the cuckoo egg after it hatches, and the greater gain in reproductive success for the host that removes the alien egg. Together, the effect of a particular cuckoo species on a host, the probability of being parasitized, and the probability of a recognition error in rejecting its own egg are likely to determine whether or not a host ejects a cuckoo egg.

In European songbirds, the variation in colour and pattern of eggs among clutches is greater in parasitized host species than in unparasitized songbirds. At the same time, the variation among eggs within a clutch is lower in these parasitized species. These interspecific differences were predicted from the theory of the co-evolutionary arms race between cuckoo and host. Presumably, there has been selection within host species for birds to

In the Greater Roadrunner, copulation is preceded by a most elaborate prancing display. The male, with food in his bill and with wings and tail raised, makes repeated dashing runs at the female; throughout this display, his crest is raised and the bare postorbital skin is exposed. This preamble can last for over two minutes, following which the male faces his mate, wags his tail from side to side and bows, then gives a "whirr" call before leaping in the air and mounting the female. As the two copulate, he finally presents the food offering to the female.

[*Geococcyx californianus*,
Mohave Desert, California,
USA.

Photo: Jeff Foott/DRK]



evolve eggs which they can recognize and thereby to avoid being parasitized by cuckoos. Another possibility is that the variation among eggs of the females of host species is an evolutionary response to within-species brood parasitism: in several species, a female may lay her eggs in the nest of another of her own species, and females which lay eggs of a rare colour or pattern are more likely to recognize an egg of a stranger when it appears in their nest. Among those species that often lay their eggs in the nests of neighbours, however, some of the latter do not reject the egg that is unlike their own. For example, Barn Swallows (*Hirundo rustica*) lay in each other's nests but do not reject the egg of another bird; this species therefore exhibits intraspecific brood parasitism, but it is not parasitized by the Common Cuckoo. The comparison suggests that the variation in behaviour among the songbird species in accepting or rejecting an alien egg is due to their past brood parasitism by cuckoos, rather than to their brood parasitism by conspecifics.

Their immediate behavioural experience with cuckoos may also affect the reactions of the hosts. Experiments have shown that nesting birds are more likely to remove an alien egg from their nest if they have seen a model of a cuckoo near their nest. They are also more likely to remove such an egg if they nest during the breeding season of the cuckoo in spring, rather than after the migratory cuckoos have departed in summer.

The choice of host species by cuckoos is probably determined not only by their individual experience in searching out the species that reared them, but also, in the long run, by the host's population level and its diet. A species which is common makes a better host than one which is rare, as a female cuckoo could find more nests and leave more young; and insect-eaters provide better food for young cuckoos. Where the adult cuckoos have a choice of parasitizing pairs or larger co-operative groups, they do not appear to seek out those birds with helpers that could raise the young, either within a host species or among species which vary in their group size.

The young cuckoos are raised in their nests by their foster parents, which show no apparent discrimination against these "changelings" which replace their own young as the focus for their parental care. Considering that the young cuckoos look unlike their own young, it is amazing that the foster parents rear the stranger. Evidently, they will feed virtually any small bird in

their nest, where the young will indeed usually be their own. There may be some advantage to caring for a chick even in the rare instance when it is not their own, because of the potential cost of discriminating and refusing to feed the parasite. The reasons for this can be explained in the following way. A brood-parasitic nestling cuckoo often hatches before the host's own nestlings, so the first young that a foster parent sees in its nest may be the parasite. If the parent began to care for the first young in its nest, learned the appearance of those young, and rejected later young that had a different appearance, then it would often reject its own young in a later nesting. Learning its own nestlings' appearance may thus be disadvantageous to a host that is parasitized, because a host that "imprinted" on the first young to hatch in its nest, a cuckoo, would reject its own chicks in later nestings as the price of developing the ability to discriminate between its own and other offspring by learning. In this way, the prior hatching of the cuckoo nestling may constrain the evolutionary response of the host.

In the brood-parasitic American cowbirds, unlike most parasitic cuckoos, the nestling parasite does not evict the host's chicks, and a foster parent can therefore see two kinds of young together in the nest. The acceptance and parental care given in the early stages may lead to an attachment of the foster adult to its brood, whether or not one of its own chicks is in the nest, so that learning may constrain the adult to continue to feed the young parasite. There is some evidence for this development of behaviour, in this case involving Great Spotted Cuckoos and their Black-billed Magpie hosts. Adult Black-billed Magpies which have already cared for a young cuckoo in their brood are more likely to accept another cuckoo placed experimentally in the nest than are those that have not previously reared a cuckoo. Although the chicks of both species are reared together, the Black-billed Magpie hosts apparently learn to discriminate as the nestlings grow older, and they increasingly feed their own young in preference to the young parasite, at least when the latter is placed outside the nest; they also tolerate alien Black-billed Magpie nestlings more often than they tolerate cuckoo nestlings, both in and outside the nest.

The young parasitic cuckoo continues to gape after it is fed, and cuckoos that do not evict their nest-mates may compete with them to the point that the foster siblings do not get enough food.



An extremely wide range of host species has been recorded as having been parasitized by one species or another of cuckoo. In the forests of eastern Asia, Horsfield's Cuckoo frequently selects the nests of *Phylloscopus* warblers in which to lay its eggs, in this case that of a Pale-legged Leaf-warbler (*Phylloscopus tenellipes*). Most cuckoos parasitize host species that are much smaller than themselves; the cuckoo chick receives all the food that would normally have been delivered to a full brood of young, and grows rapidly.

[*Cuculus horsfieldi*,
Russian Far East.
Photo: Yuri Shibnev/
Planet Earth]

Unlike the nesting cuckoos, the chicks of which often excrete a foul-smelling liquid, the young nestlings of the parasitic cuckoos deposit their excreta in a gelatinous skin, in the same way as do passerine birds; the package is then carried away by their foster parents. This may be an evolved adaptation to gain continued parental care from the foster parents.

Although the parasitic cuckoos do not raise their own young, the adult males occasionally feed fledged young cuckoos of their own species, either a lone, calling fledgling or one calling while its foster parents are feeding it. This behaviour appears to be misdirected courtship feeding by the cuckoo. These males, usually of the crested cuckoos, or the glossy cuckoos and bronze-cuckoos, belong to the species which also feed caterpillars to their females, and they feed the young as if they were potential mates. Adult parasitic cuckoos do not feed young cuckoos which are still in the nest.

Successful brood parasitism depends on the cuckoos choosing not only a host that will accept their eggs and young, but also one that will bring the appropriate food to the nestlings. Cuckoos, being insectivorous themselves, generally parasitize species which provide insects for their young. The insect diet allows the young cuckoo to grow in the nest and to develop. A few species of cuckoo, however, are able to parasitize hosts that supply other kinds of food to their young. The African Emerald Cuckoo exploits mostly insectivorous hosts, but it also parasitizes the Yellow-whiskered Greenbul (*Andropadus latirostris*), which raises the young cuckoo on fruit. The Diederik Cuckoo parasitizes some weavers (*Ploceidae*) and bishops (*Euplectes*) which feed their young on a diet of seeds, although they also bring some insects to the young.

Because young cuckoo fledglings are loud and persistent in their begging, not only do they attract their own foster parents that reared them, but they may also attract adults of other bird species, and these sometimes feed the fledged cuckoo. As many as four different species of bird have been seen to feed a fledged Pallid Cuckoo, although only one host reared it. This attractiveness of a young cuckoo to other birds, perhaps failed breeders that have recently lost their own young, means that not all observations of fledged cuckoos being fed by an adult bird are good indicators that the feeder in question was also the foster species.

In Africa, the marsh-nesting colonial Red Bishop (*Euplectes orix*) is often parasitized by Diederik Cuckoos which lay

unspotted blue eggs similar to its own in the closed nest. In experiments, the bishops also usually accept model eggs which differ in colour or which are patterned, but not eggs that are very dark or very heavily marked. Presumably because they may reject their own eggs by mistake in the closed nest, these hosts appear to be constrained in their defence by the costs of rejection. The cuckoos, however, are unable to take full advantage of the limited discrimination of their hosts, because, in the large colonies where these birds habitually nest, the numbers of bishops that defend the area are usually sufficient to drive off the cuckoo and prevent it from laying. The rates of cuckoo parasitism are therefore smaller in the larger colonies. The cuckoos may have the advantage in the balance between costs and benefits only in the smaller colonies that are not so intensively defended.

In many tropical areas, the identification of cuckoo eggs is a problem to ornithologists as well as to the nesting hosts. In India, where several cuckoo species occur and may overlap in their exploiting of host species, it is not known for certain which eggs belong to which species of cuckoo. Some of the egg identifications of the influential ornithologist E. C. Stuart Baker, published in the earlier part of the twentieth century, have been called into question. Baker described many eggs that were found in the oviducts of female cuckoos, so the identification in these cases is assured. Cuckoo eggs found in nests, however, are sometimes of questionable origin, since different species may lay similar eggs. The identification of a cuckoo egg should be determined by measuring and photographing the egg, and then leaving it in the nest to hatch and develop into a recognizable young cuckoo. Alternatively, a young cuckoo from a known egg could be reared by hand and examined as it grew, as has been done in Japan. A broad conclusion that can be drawn from this and other cases is that much fieldwork is still needed to determine the details of the life histories of the tropical brood-parasitic cuckoos.

Co-operative breeding is a feature of cuckoos belonging to the subfamily *Crotophaginae*. These species usually live in groups, and more than one female lays in the nest. Guira Cuckoos breed together, with a communal nest, yet there is much conflict and competition among the breeding adults. Guiras are the most markedly group-living species among the cuckoos. Not only do they feed in groups, but they also almost always nest together, and several females lay in a single nest, which contains as many

The most widely studied cuckoo in the Old World is the Common Cuckoo, the most notorious nest parasite of all birds.

The female cuckoo, having located a suitable host nest by watching the nest-building birds from a concealed perch, later visits the nest while the rightful owners are absent and deposits her egg in it.

This is timed to coincide with the host species' laying period, and at a stage when the host has already laid one or more eggs but has not started to incubate. The cuckoo generally removes a host egg, later consuming it, or sometimes even eating several eggs on the spot.

The removal of a single egg ensures that the total number of eggs in the nest remains the same, which may reduce the risk of the host deserting; consuming the egg provides the female cuckoo with minerals to help her form further eggs of her own.

The cuckoo chick, a day or two after hatching, evicts other eggs or chicks, by manoeuvring its body under them and then pushing them over the side; such behaviour is known for about half of the species of parasitic cuckoo. In such instances the young cuckoo then has no competition from any nest-mates, and is normally reared successfully by its fosterers, which, by contrast, are unable to raise any young of their own. One of the most frequent hosts of the Common Cuckoo is the European Reed Warbler (*Acrocephalus scirpaceus*), as in these two photographs.

[*Cuculus canorus*.

Photos

Above: George Reszeter/
Oxford Scientific Films.

Below: Gilles Martin/Bios]





Once they have left the nest, the young of brood-parasitic cuckoos continue to beg loudly and incessantly for food. They receive regular and frequent feeds from their foster parents, but their persistent calling also attracts adults of other bird species, and these are not uncommonly stimulated to feed the fledgling cuckoo. Although the Red-chested Cuckoo does parasitize the nests of Cape Wagtails (*Motacilla capensis*), the fact that an adult of the latter is observed feeding a young cuckoo does not in itself constitute definite proof that the wagtail actually reared this cuckoo.

[*Cuculus solitarius*,
Africa.
Photo: Alan Weaving/
Ardea]

as 20 eggs. These are blue-green and, when fresh, have chalky splotches that might allow each female to recognize her own eggs and give them special care. Adult Guira Cuckoos perch on the nest, remove an egg and drop it on the ground, and they also bury other eggs in the nest. In a population of this species in Brazil, 32% of all eggs laid were lost or disappeared: of these, 76% were found on the ground below the nest, where they had been tossed by other adult Guiras, presumably members of the group, during laying and incubation. Chicks are sometimes removed by the infanticidal adults, and the young may kill other nestlings. In a molecular-genetic study that compared the DNA fingerprints of young with those of the attendant adults, the nest-mate chicks were offspring of different adults. In addition, the chicks were usually half-siblings but not full siblings, indicating that the adults were not sexually monogamous in mating. Together, at least two females accounted for more than half the young in a nest; in other words, a single female was not responsible for most of the young raised in a nest, although a dominant female may leave more than her share of the offspring.

Although all the adults attended the nest and cared for the young, no more young fledged in the communal nests of the larger groups than in the other groups, and the number of young fledged per adult did not differ among the small, medium and large groups. Furthermore, the probability of at least one young fledging did not vary with group size. More eggs were laid in groups containing more adult cuckoos, but the number of eggs that were lost was also greater. An adult "sentinel" remains in attendance at the nest while the other group members forage away from the nest, and the attendant is thought to alert the group to any predator threat. When a threat approaches, the attendant gives loud staccato calls, and the other group members then converge on the nest to defend it.

Both the Guira Cuckoo and the anis are highly social. They perch in contact, pressed against each other, they roost in contact, and they preen each other; this allopreening is known among cuckoos only for these group-living species. The Guira Cuckoo's ectoparasites, and particularly its mallophagan feather lice, are common both on the birds themselves and in their nests, and these appear to determine the nesting behaviour of the cuckoos. When Guira Cuckoos breed for a second time in a season, most groups move to a different tree for the second nest. This change

of nest-site may decrease the effects of nest infestation by parasitic insects, or reduce the risk of nest detection by predators.

Groove-billed Anis of tropical America also breed in groups or in pairs in open habitats, such as pastures with scattered trees. Their breeding biology has been observed more closely than that of any other cuckoo in which birds were individually recognizable. Most breeding groups contain two or three pairs of anis, although some have an odd number of adults. Within the social group, each female has a mate with which she spends much of her time in a monogamous social bond. Females lay their eggs in a single communal nest. All members of a social group use the entire territory in the breeding season, although in the dry season the birds move from their territory into areas of other groups, or abandon their territories and move to the edge of a forest. The individual anis which live in social groups containing more adults show higher survival in the breeding season, but they do not produce a higher average number of fledged young; the larger groups produce more fledglings, but not in proportion to the number of females in the group. Certain females are much more successful than others. The eggs of the early-laying females are tossed from the nest by the later-laying female, the bird that is socially dominant in the breeding group. Males incubate at night and females in the daytime; although the males that mate with the dominant females may leave more young, since their mates remove the competition from the nest, these males are more likely to be taken by a predator, when exposed on the nest at night, so there is a risk in mating with the dominant female. Brooding females are occasionally fed on the nest by another conspecific. This behaviour is commoner in the Smooth-billed Ani. Juvenile anis sometimes feed the younger nestlings of the second brood.

After they fledge and are independent, the young anis usually disappear from their group and move out of the area. A few remain, however, either as non-breeders or to become breeders in the group in which they were reared. They succeed in becoming breeders when another bird in the group disappears, or when they enlarge the size of the group; research has shown that all these non-dispersing breeding birds are males. Observations of individually marked birds indicate that the breeding adults in a social group generally are not closely related to each other. This is because siblings tend not to move together when they disperse, most birds do not breed in the group in which they were

Not all young parasitic cuckoos evict their host's eggs and young: the Great Spotted Cuckoo is one of several species that tolerate the host's young.

This species often parasitizes Black-billed Magpie (*Pica pica*) nests, the chicks of both species being reared together; as the chicks grow, however, the magpies apparently learn to discriminate, and increasingly feed their own young in preference to the parasite. If the magpie's eggs fail to hatch, as in the case seen here, the young cuckoo prospers. A cuckoo that hatches in the nest of a smaller starling may evict the host's young, or take all the food while the latter starve.

[*Clamator glandarius*,
Madrid, Spain.

Photo: Luis Miguel Ruiz
Gordon]



hatched, and males but not females show some tendency to breed in their natal group.

As already stated, however, the majority of cuckoo species are neither brood parasites nor co-operative breeders. They breed as single nesting pairs. In this respect, the breeding behaviour of the Greater Roadrunner has been particularly well studied. The male roadrunner frequently brings food in the form of mice, small birds, snakes and lizards to his female before mating, and also feeds her during copulation. Partners copulate at the place where they will build the nest, and continue to do so by the nest even after their clutch is complete. Copulation appears to have a social function in bonding the pair together, as well as a fertilizing function when the female is still ovulating. The nest-site is usually in an isolated thicket of small trees, such as mesquite, and bushes, in an area near open ground or short grass, where the birds display and forage. The nest is built 1-3 m above the ground, occasionally higher, in the crotch of a tree or resting along a horizontal branch, usually well concealed and near the centre of the bush or tree. Roadrunner nests can be located by watching and following an adult roadrunner as it runs over the ground with a snake or lizard held in its bill. The bird makes a beeline for the nest shrub, and then hops up to the nest by the lower stems of the shrub. Nests are constructed mainly by the female. The male brings building material in the form of thorny twigs and branches to the site, and gives them to the female when she gives a "whine" call; she incorporates them into the nest. She lays the larger sticks around the edge and the thinner sticks near the centre of the nest, probably to cushion the eggs and nestlings. The pair may begin several nests and desert a site after building for only a few minutes. At the site selected for the final nest, the female builds the platform and then adds a lining of finer material such as leaves, grass, mesquite pods, snakeskin, and dry flakes of cattle and horse dung, as well as feathers. The stick nest is a flattened cup that averages about 30 cm in outer diameter, with an inside depth of 5-10 cm and an outside depth of 15-20 cm. Some pairs continue to build their nest during the incubation period, and the height of the nest may increase as the nestlings hatch and grow and require a larger and more protected living space.

Roadrunners lay a variably-sized clutch of smooth white eggs, usually 3-6 and sometimes as many as nine. Sets of 12-13 eggs

are occasionally seen, but these are perhaps the result of more than one female laying in the same nest. Nevertheless, an individual female can vary the number of eggs she lays; the range of a single female can be 2-6 eggs, and the clutch is often larger after good summer rains and when food is abundant. The eggs are laid usually on alternate days, but also at irregular intervals ranging from one day to four or even nine days, and the birds begin to incubate before the complete clutch has been laid. The eggs are covered continuously, the incubating parent remaining on the nest until its mate arrives to relieve it. The first eggs hatch in about 18 days, but, since some eggs are laid after incubation has begun, the young birds hatch asynchronously on a staggered schedule on different days; the young in the brood are therefore of different sizes, and the age difference between largest and smaller siblings may be as great as seven days. When the chick hatches, the female parent carries the eggshell from the nest, where she breaks and eats it. Last-laid, unhatched eggs are often abandoned in the nest after the first-hatched young have fledged, and the last young roadrunner may remain in the nest a week after the other nestlings have fledged. Success of the mixed-size brood is thought to vary with feeding conditions: all young may be fed if food is abundant, but the adults eat their own young nestlings when food is short.

The young roadrunners remain in their nest while both parents bring food. Both also brood the young, nearly continuously for the first four days and at cool periods later. The adults deliver such food items as lizards and snakes intact to their young; the only treatment they give is to beat the vertebrate prey into a flexible form, while in the case of grasshoppers they remove the hind legs. The adult eats the faecal sac as soon as the nestling defecates. Adults may eat their own young nestlings when the latter are unresponsive or weak, or they may feed these young to the larger and stronger nestlings when food is short. Nestlings may evict their younger siblings from the nest, behaviour reminiscent of the brood-parasitic cuckoos. Nestling roadrunners give a loud vocal "churr"; when disturbed, they rattle the bill and excrete a blackish foul-smelling liquid not unlike that of disturbed snakes.

When the young are somewhat grown, the parents give a series of soft "coo" calls to entice them to leave the nest. They fledge in 17-19 days, or as late as 25 days, or they leave earlier if

they are disturbed in the nest. Roadrunner young at fledging are often only 50% of the average adult weight, and they have been observed foraging with their parents when 70% of the adult size. The adults lead their young farther from the nest during the course of a few days after they have fledged. The fledglings follow their parents on the trail to their feeding areas, where they continue to be fed, quivering their wings as they beg for food, until they can feed themselves competently. Independence from the parents gradually develops about 30-40 days after the young have left the nest. Although the young develop the orange postorbital skin and the grey legs at 14 days and 11 days respectively, while still in the nest, the mouth becomes marked with black only at 50-55 days of age and is not fully black until 80-85 days.

The female Greater Roadrunner sometimes lays a second clutch while her fledglings are still begging from the male, and this complementary biparental care allows the pair to hatch and raise two broods, with the second nesting attempt beginning a month after the first. In Texas, a pair has been seen to have three nests in succession, the first in April, the second in June and the third in August, all of them successfully fledging young. Another pair nested again in July, while still feeding the fledglings from their earlier nest. Some second broods are raised in the same nest as the first, but in other cases a new nest is built.

The complementary parental behaviour of male and female roadrunners in nesting has been studied in California, using radio-telemetry. The males incubate at night, but the partners take turns incubating during the day, with the female spending two long spells on the nest. Males maintain their night-time body temperature at nearly the same as the daytime level. In contrast, the females, which incubate in the daytime only, and also the non-incubating males, lower their body temperature by 5°-8°C at night. Birds that drop their body temperature can save about 36% of their energy requirements during this period. Breeding males are generally in more robust condition, as they have fat deposits under their skin and, at an average of 354 g, they are heavier than non-breeding males, which average 314 g, whereas breeding females have to recover their pre-breeding weight during the period when the male undertakes the night shift. Laying females average 318 g in body weight, but during early incubation they average 290 g; females have regained their former condition by the nestling period, when they average 325 g. Males are in good

condition at the onset of incubation, while post-laying females have depleted their energy reserves. Females therefore stand to gain from nocturnal hypothermia, when they can use their food to regain their body condition rather than maintaining a high metabolic rate, and males are better able to undertake the apparently expensive nocturnal incubation.

Roadrunners may be typical of nesting cuckoos in the major features of their nesting, although most cuckoo species have not been observed in detail. One of the features that may be widespread among nesting cuckoos is that both the male and the female incubate, feed the young in the nest, and tend the fledglings. In the case of the Black-billed Cuckoo, the members of a pair alternate their attendance on the nest during incubation, with each member remaining motionless on the nest for nearly two hours. The female incubates at night, and the male takes over at the time of the first feed in the morning. In most species of coucal, both parents care for the young, although males may take a greater part than females. Also, the passing of food between mates appears to be widespread in the nest-building cuckoos; at least a few coucals, as well as the Black-billed Cuckoo, pass food from one mate to the other in a courtship-feeding display. This transfer of food from male to female before or during the laying period may provide the female with extra nutrients for the formation of eggs, and this extra food may in fact ensure that she has enough food to develop the eggs. In addition, the behaviour may be useful to a female nesting cuckoo before she mates with a male, by providing her with a clue to assess the future performance of the male as a provider of parental care to the young.

Movements

In tropical and subtropical areas, cuckoos arrive at their breeding grounds early in the rainy season and breed at the time when the host species begin to nest. Cuckoos are often called "rain-birds" because their conspicuous arrival and songs coincide with the season of rains. The migrations of the brood-parasitic cuckoos which move long distances between their breeding and non-breeding areas are timed to coincide not only with the season when their hosts breed, but also with the emergence and abun-



Most cuckoos are neither parasites nor co-operative breeders, but live in pairs and build their own nests. All coucals, like this Senegal Coucal, are nest-builders. Unlike the platform nests of other nest-building cuckoos, however, that of coucals is a large spherical or domed construction of grass and leaves, with a side entrance; the adults add green leaves to the nest before laying and throughout incubation. Coucals have a short nesting cycle, but they lay large clutches and generally experience high breeding success. Chick growth is rapid, and juveniles reach maturity early.

[*Centropus senegalensis senegalensis*, near Monrovia, Liberia. Photo: Michael Gore]

dance of caterpillars, which are predictable with the onset of warmer weather in spring in the high latitudes.

Cuckoos which breed in the higher latitudes are known, from their seasonal occurrence in the breeding region, to winter in distant regions. Some species have remarkable long-distance migrations between their temperate breeding grounds in the northern continents and their wintering grounds, which are invariably at least partly south of the equator. Two species that breed in North America, the Black-billed and Yellow-billed Cuckoos, migrate into South America and winter south of the equator, while the Pearly-breasted (*Coccyzus euleri*) and Dark-billed Cuckoos undertake comparable movements between their breeding areas in southern South America and their wintering grounds north of the equator in South America. Two other American cuckoos are apparently at least partly migratory: northern populations of the Mangrove Cuckoo are seasonal in appearance in Florida and the Bahamas; while Ash-coloured Cuckoos (*Coccyzus cinereus*), which breed in central and southern-central parts of South America, are known to move across high mountain ranges in northern parts of South America, at any rate on occasions.

Five cuckoos in the northern parts of the Old World complete long-distance migrations, with at least some of their populations moving seasonally across the equator. These are the Great Spotted, Common, Himalayan, Horsfield's and the Asian Lesser Cuckoos (*Cuculus poliocephalus*). European Great Spotted and Common Cuckoos migrate to Africa, flying non-stop over the Mediterranean and the Sahara Desert, a distance of more than 3000 km. Other cuckoos migrate from continental Asia as far as the Philippines and Indonesia, as is the case with the Asian hawk-cuckoos and the Asian Drongo-cuckoo; or they migrate long distances from Asia and over the Indian Ocean to Africa, as do Indian populations of the Jacobin Cuckoo, some Common Cuckoos and the Asian Lesser Cuckoo. Some cuckoos appear during the migration season on islands in the Indian Ocean, between their breeding and wintering grounds, and those which turn up on the coast in Kenya have flown over 3000 km between India and their wintering area. Madagascar Lesser Cuckoos (*Cuculus rochii*) migrate from their breeding grounds to "winter" in continental Africa.

Certain species regularly migrate within Africa, moving from their breeding grounds in South Africa to equatorial and even northern sub-Saharan parts of West Africa; these include the black morph of the Jacobin Cuckoo and also the Black Cuckoo (*Cuculus clamosus*). Other cuckoos move with the seasons of rainfall in West Africa, where they are found near the more humid coast in the dry season which is shorter there than inland, and then occur farther northwards in the drier, more seasonal savanna of the Sahel during the rains. Among these are the Jacobin, Levaillant's (*Clamator levaillantii*), the Black, the African Emerald, Klaas's and the Diederik Cuckoos and the African Black Coucal, although some of these may also remain as residents in the more coastal areas throughout the year.

In the Australo-Pacific region, certain cuckoos migrate from their southern breeding grounds in temperate regions of Australia and New Zealand to winter in the tropics, sometimes north of the equator. Such movements are undertaken by Horsfield's Bronze-cuckoo, the Shining Bronze-cuckoo, the Channel-billed Cuckoo and the Long-tailed Koel (*Eudynamis taitensis*).

Migrating cuckoos are often very fat, and their stores of fat may persist into the period spent on their non-breeding grounds. This was demonstrated by one Common Cuckoo from the Palearctic which was caught in South Africa in December.

The long-distance migrants occasionally appear on the wrong side of the ocean following disorientation. North American Black-billed and Yellow-billed Cuckoos appear as accidentals on the North Atlantic islands and in northern Europe, the former having been recorded as far east as Italy and the latter as far east as Sicily. Conversely, from the Palearctic, Common Cuckoos turn up in northern North America, both in Alaska and on the Atlantic coast, and Horsfield's Cuckoos occasionally appear in Alaska.

The migration behaviour of cuckoos has been studied in most detail for the Black-billed and Yellow-billed Cuckoos. These cuckoos move at night, and they orientate by the pattern of the stars, as has been shown in planetarium experiments. In autumn,



they undertake an over-water flight of 2000-3000 km from their breeding grounds in North America to the West Indies, whence they continue onwards to South America as far as northern Argentina, or they fly directly as much as 4000 km from North America to the mainland of South America. Yellow-billed Cuckoos appear on migration in places where they do not breed, turning up on islands off the coast of Florida each month from May to August. Their appearance at these places in these months suggests that spring migration may continue as late as June, and that the return to the south may begin by July, although, as these cuckoos may breed in eastern North America as late as August, the later individuals on these islands may be dispersing rather than migrating. Cuckoos also appear as casualties below television towers, the lights of which attract nocturnal migrants, which crash into the towers; the dead or stunned birds thus provide a sample of nocturnal movements. At the television towers, as on isolated islands, the cuckoos appear throughout June and July. Other Black-billed and Yellow-billed Cuckoos migrate overland, where they are seen in Panama from September to November, and again in April, but not during the northern winter, when they are generally observed only in South America. Like juveniles of other nocturnal migrants, the young cuckoos, without any previous experience, are nevertheless able to find their way to their wintering grounds. This is demonstrated by the fact that hand-raised cuckoos become active at the appropriate time of the migration season, and orientate their nocturnal restlessness in accordance with the pattern of the starry sky.

Other migratory cuckoo species may have similar behaviour. Young brood-parasitic cuckoos have no opportunity to learn their migration routes from their parents, as the adults leave their northern breeding grounds several weeks before the juveniles depart from their natal areas. Adult Great Spotted and Common Cuckoos, for example, appear in Africa in late summer, several weeks before the arrival of the first juveniles in autumn. Both breeding species of cuckoo in New Zealand, the Shining Bronze-cuckoo and the Long-tailed Koel, are nocturnal migrants which winter on remote islands in the Pacific Ocean, more than 1000 km from their breeding range. On the other hand, the large Channel-billed

The typical nest of *Coccyzus* and some other nest-building cuckoos is a shallow cup of sticks. In the Black-billed Cuckoo, incubation and brood-feeding duties are shared by the male and the female, a set-up which probably applies to many other nest-building cuckoo species. The sexes incubate in turns during the daytime, each bird sitting for about two hours before being relieved by its mate. The female Black-billed Cuckoo incubates at night, the male taking over again in the morning. In all, the incubation period lasts 10-11 days, beginning with the first egg.

[*Coccyzus erythrophthalmus*, upstate New York, USA. Photo: Robert A. Lubeck/Animals Animals]



Co-operative breeding is restricted, in cuckoos, to the subfamily *Crotophaginae*. *Guira* Cuckoos not only feed in groups but also breed together, several females laying up to 20 eggs in a communal nest. Among the breeding adults, however, competition is great. Irregular markings on the eggs possibly enable each female to single out her own eggs for special care. Adults regularly remove eggs and drop them on the ground, and bury others deep in the nest. In one study in Brazil, 32% of all eggs failed, most having been dropped below the nest. Adults sometimes kill chicks, which in turn may kill other nestlings.

[*Guira guira*,
Pantanal, Brazil.
Photo: Haroldo Palo Jr.]

Cuckoos migrate during the daytime, looking like large flying southern crosses overhead as they move between northern Australia and their wintering grounds further north.

In contrast to these migratory species, most tropical cuckoos are resident and remain throughout the year in their forest area. This is true notably of the ground-cuckoos of both the Old and New Worlds, the Madagascar couas, and the malkohas and many coucals. Some resident cuckoo species, however, exhibit a marked post-breeding dispersal, when they may range far from their natal and breeding areas. The anis occasionally show up at the end of summer in northern North America, more than 1000 km from their breeding grounds, and South American *Guira* Cuckoos have appeared during this same period in the Netherlands Antilles.

Relationship with Man

In much of our literature, the term "cuckold" implies social amorality, in English as in Portuguese, where *cuco* is a man whose wife is unfaithful to him, so that he may be left to care for an offspring that genetically is not his own, much as the foster parents raise a young cuckoo that is not their own offspring. Cuckoos have also been given the reputation of social folly, perhaps based on their neglect of their own family, and to call another person a "cuckoo" is to label him a silly person.

The other widespread role of cuckoos in folklore is as weatherbirds: cuckoos on most continents are known as "rain-birds", because they call incessantly early in the rainy season. To some farmers this suggests that the birds are telling them when to plant, although in fact the cuckoo is calling to other cuckoos and advertising his territory and his availability for a mate. In the present day, this informative role of cuckoos is interpreted in a different way, cuckoos now being regarded as sensitive ecological indicators of environmental degradation. When cuckoos disappear, so do other bird species and also their forest habitats. Cuckoos are secretive, however, and it is usually more obvious that the forests themselves are gone than that the cuckoos have disappeared!

The best known cuckoo in North American folklore is the Greater Roadrunner, also known as the Chaparral Cock, the War Bird, the Medicine Bird, or the Snake-eater of the South-west. Roadrunners have a special status because they kill and eat snakes,

especially, in the popular mind, the poisonous rattlesnakes. One story has it that roadrunners can trap a sleeping rattlesnake by encircling it with joints of prickly cactus. When the bird drops a cactus on the snake, the reptile awakens, tries to escape the cactus corral, and spikes itself on the cactus spines; the roadrunner then eats its captured snake. Although roadrunners do take rattlesnakes, they have never been photographed in the act of building a corral!

The native Americans of the south-west USA see the roadrunners as part of the supernatural world and possessed of great powers. Like other cuckoos, these birds have a zygodactyl foot with two toes forward and two behind, and their footprints leave the sign of a cross. This mark has given the roadrunner a special status among rural folk in areas with Catholic missions. In 1790, an anonymous Franciscan priest in Mexico wrote of "a kind of pheasant which has a long bill, dark plumage, a handsome tail and four feet. It has these latter facing outward in such fashion that when it runs it leaves the track of two feet going forward and two going backward." If we read "toes" instead of "feet", the description is that of the roadrunner. In Hopi culture, the "X" is a design used on kachina figures to keep away evil spirits, which are unable to follow because the direction of travel is unknown. In the Pueblo culture, roadrunner tracks are laid around the house of the dead in order to mislead evil spirits so that they cannot follow the soul of the dead, and at the funeral the relatives and friends mark an "X" on their soles and palms to prevent the dead from following them. They also attach roadrunner feathers to cradle boards and hang the birds' skins over lodge doors for good luck, and to avoid the evil spirits. Although the tracks of the roadrunner form an "X" shape, the direction of travel is nevertheless clear by the length of the toes: the two toe-tracks of nearly equal length point in the direction taken by the bird, and men lost in the desert have followed these tracks to find their own way. In Mexico, roadrunner flesh was thought to have medicinal value, and was eaten to cure itch and boils, to purify blood, and to bring babies.

Roadrunners are respected for their courage, their strength and their endurance, and, because "you are what you eat", the native peoples ate them to gain their strength and swiftness. The Hopi tied roadrunner feathers to their horses' tails for the same reasons. Roadrunners have long been important in this area in

The Red-fronted Coua is a terrestrial bird, but, like other terrestrial cuckoos, it nests in trees. Its nest is much the same as those of other species of coua, a simple bowl of palm fibres, dry stalks and leaves, measuring about 19 cm across and 9 cm high, placed 5-7 m above ground. This is a relatively common coua, mostly inhabiting undisturbed rain forest and dense secondary forest, with a liking for areas of fallen branches.

[*Coua reynaudii*,
Madagascar.

Photo: Dominique Halleux/
Bios]



rural culture, and they are shown in ancient petroglyphs, prehistoric rock carvings, in Texas and in New Mexico. At present, they are pictured in paintings, jewelry and clothing by the European-derived population of the regional south-west in Arizona, New Mexico and west Texas, although with a less compelling cultural significance. These icons are used across age groups, with school sports teams of young students called "Roadrunners" in Arizona, right through to older people as well who hope to gain the iconic speed, strength and endurance of the roadrunner. The famous animated cartoon, depicting a roadrunner capable of running at incredible and greatly exaggerated speed, is familiar to audiences throughout the world.

Worldwide, the most recognized cuckoo is the Common Cuckoo of the Palearctic, where it has been known since Aristotle's time to be a brood parasite. Cuckoos have featured in the oral traditions and literature in Europe, especially in earlier times when people lived by more rural scripts.

Shakespeare's plays mention the cuckoo as a voice in the wilderness, of little importance, without recognition of his kin and *homo repudiandus* (Prince Hal consorted with Falstaff and the rioters, and neglected his social intercourse with the court):

"So when he had occasion to be seen,
He was but as the cuckoo is in June,
Heard, not regarded--"
(*King Henry IV, Part I*, III, 2, 74-76);

as a brood parasite that destroys its host and family (the Fool, as Lear's daughter Goneril evicts the King and strips him of his dignity):

"For you know, nuncle,
The hedge-sparrow fed the cuckoo so long
That it's had its head bit off by its young.
(*King Lear*, I, 4, 203-205);"

and, again, as a usurper (Worcester to Henry IV, who as Bolingbroke deposed Richard II and gained his crown):

"As that ungentle gull, the cuckoo's bird,
Useth the sparrow--did oppress our nest,

Grew by our feeding to so great a bulk
That even our love durst not come near your sight
For fear of swallowing; but with nimble wing
We were enforced for safety sake to fly
Out of your sight and raise this present head;"
(*Henry IV, Part I*, V, 1, 59-66);

and foremost as a cuckold (the ending refrain, after a game of mate choice has taken a turn of mistaken identity and pairs have become concerned and confused about the sexual fidelity of their mates):

"The cuckoo then, on every tree,
Mocks married men, for thus sings he: Cuckoo!
Cuckoo, Cuckoo! O word of fear,
Unpleasing to a married ear."
(*Love's Labour's Lost*, V, 2, 879-882).

The theme of illegitimacy through cuckoldry (Clown, to Bertram, and cuckoo song) occurs also in *All's Well that Ends Well* (I, 3, 58-61), in the cuckoldry farce of Falstaff in *The Merry Wives of Windsor* (II, 1, 107-121; II, 2, 267-302; III, 3, 38 ff), and by Pompey to Antony, a lover of a faithless woman and a man who will not long remain in power in the land:

"At land indeed
Thou dost o'ercount me of my father's house:
But since the cuckoo builds not for himself,
Remain in't as thou mayst."
(*Antony and Cleopatra*, II, 6, 27, 26-29).

Missing only is an account of the particular mechanism of eviction of host eggs and nestlings by the young cuckoo (although Goneril in *King Lear* comes close). Eviction was not recorded until two centuries later, by E. Jenner in 1788.

Cuckoos are the ultimate changelings, "a child secretly substituted for another in infancy" (*Oxford English Dictionary*); the foster parents rear a young unlike their own. Their changeling properties have been exaggerated, as in the superstition that a sparrowhawk changes into a cuckoo in summer. Aristotle dismissed the myth as incredible, and so it is.

Oral tradition knows the cuckoo as a seasonal migrant which lives in Europe for only a few months of the year:

"Cuckoo, cuckoo, What do you do?
In April, I open my bill;
In May, I sing night and day;
In June, I change my tune;
In July, Away I fly;
In August, Go I must."

Cuckoos are often mentioned in songs, as well:

"The cuckoo is a merry bird,
She sings as she flies;
She brings us good tidings,
And tells us no lies.
She sucks little birds' eggs
To make her voice clear,
That she may sing Cuckoo!
Three months in the year."

Poetry and folk songs also allude to the cuckoo's reproductive performance in laying many eggs in a season:

"Cuckoo, cherry tree,
Lay an egg, give it me,
Lay another, Give it my brother..."

Cuckoos have their social place in folk and rural medicine, although there is no established basis to suppose that they are pharmaceutically useful, not even in the case of the black anis that are used against venereal disease. Nestling coucals are taken by man for medicinal purposes in Borneo: the legs of the chicks are broken, and the adult coucals are said to bring healing herbs which they partly digest and regurgitate to the chicks as a dressing for the legs; then, when the chicks have been healed, they are bottled in spirit and the liquid is used as a cure for many problems, especially rheumatism. Apart from these medicinal uses, cuckoos are not often taken for food. Many are said to be distasteful, although this evaluation, like that of their medicinal value, has a cultural bias. Coucals are occasionally eaten by man in some societies.

In the presence of humans, most cuckoos are shy and skulking, although the anis are often tame and allow a close approach.

Cuckoos are not often kept as pets, and only a few like the Coral-billed Ground-cuckoo and the Guira Cuckoo are kept in zoos at all frequently. They are not crop pests, nor have there been any attempts to control the numbers of the brood-parasitic cuckoos where they might affect the breeding numbers of their hosts. Cuckoos have their most interesting relationships with man as subjects of research for naturalists and biologists, those with an interest in the evolution of mating systems and breeding styles, coloniality, brood parasitism and co-operative breeding.

Status and Conservation

As with many, or perhaps most, of the world's animal species, the population levels of many cuckoos are not known with any degree of accuracy. The best assessments of their relative abundance are generally expressed in such terms as "common", "not uncommon" and so on, and in most cases are derived from non-systematic observations in the field. As is to be expected nowadays, a better indication of the status of a species is normally available only for those with populations that are thought to be in a less healthy condition.

The only cuckoo that in historical times is virtually certain to have become extinct is the Snail-eating Coua (*Coua delalandei*). The largest species of coua, it lived on Île Sainte Marie, a small island on the north-east side of Madagascar. It probably disappeared from Madagascar around 1835 at a time of deforestation, with a secondary cause of extinction being hunting, and perhaps also the introduction of rats which may have adversely affected its food supply, terrestrial snails.

Those cuckoos most at risk of extinction and with numbers in danger of dropping to critically low levels are the species of tropical evergreen forests, and also the island cuckoos with small populations. Apart from the Snail-eating Coua, the species considered most at risk is the Black-hooded Coucal (*Centropus steerii*), confined to Mindoro in the Philippines, where it is considered to be extremely close to extinction, probably as a result mainly of habitat loss and fragmentation. Eight other cuckoos currently reckoned to be threatened with extinction are the Red-faced Malkoha (*Phaenicophaeus pyrrhocephalus*), the Sumatran (*Carpococcyx viridis*) and Bornean Ground-cuckoos (*Carpococcyx radiatus*), the Sunda Coucal (*Centropus nigrorufus*), the Green-billed Coucal (*Centropus chlororhynchus*), the Cocos



All young cuckoos are altricial, but they grow rapidly in the nest. Those reared by their own parents, as is the case of Yellow-billed Cuckoos, leave the nest in as little as ten days, and may fledge a day or two before that. This species and the Black-billed Cuckoo (*Coccyzus erythrophthalmus*) have exceptionally long breeding seasons, extending from about April, when the earliest insectivorous passerines nest, and continuing through to early September in areas where insects are abundant. Both then migrate to South America.

[*Coccyzus americanus*,
Alma, Illinois, USA.
Photo: Richard Day/
Oxford Scientific Films]

The cuckoos most at risk are those living in tropical evergreen forests and those with restricted ranges. Several coucals figure prominently among the list of threatened and near-threatened cuckoo species. The Goliath Coucal, although confined to six islands in the Moluccas, is not currently considered at risk; indeed, it appears even to be common on Halmahera. Nevertheless, it has not been seen recently on two of the six islands of its range, and any further loss of habitat in the remaining islands could easily push it into the danger zone.

[*Centropus goliath*, Halmahera, Moluccas. Photo: Morten Strange]



Cuckoo (*Coccyzus ferrugineus*), the Rufous-breasted Cuckoo (*Hyetornis ruficularis*), and the Banded Ground-cuckoo (*Neomorphus radiolosus*). Of special interest is the Sumatran Ground-cuckoo, which has not been seen since 1916, although it may still persist in the remaining forests of that immense island; its status as a distinct species, recognized years ago but overlooked in recent years, gives additional reason for discovering more about it in the field.

Several other cuckoos are considered near-threatened, especially those with restricted ranges, often limited to islands. These are the Coral-billed Ground-cuckoo, Verreaux's Coua (*Coua verreauxi*), the Kai Coucal (*Centropus spilopterus*), the Biak Coucal (*Centropus chalybeus*), the Short-toed Coucal (*Centropus rectunguis*), the Brown Coucal (*Centropus andamanensis*) and the Rufous Coucal (*Centropus unirufus*); on the same list belongs the race *squamiger* of the Rufous-vented Ground-cuckoo (*Neomorphus geoffroyi*), which is sometimes considered a distinct species.

The status of two cuckoo taxa remains more or less unknown. The Moluccan Cuckoo (*Cacomantis heinrichi*) is known only from five specimens collected in 1931, and has not been recorded since then. The subspecies *rufomerus* of the Little Bronze-cuckoo, sometimes considered a separate species, inhabits six small islands east of Timor, Indonesia; it is very little known. The true status of both of these cuckoos, and the nature of any threats facing them, are unclear.

Cuckoos on small islands are also at risk when they live in areas where tidal waves can destroy large tracts of lowland forest. Lowland and montane forests in the tropics, especially those in Malaysia, Indonesia and the Philippines, are in imminent danger of losing their cuckoos, along with the rest of their diverse array of birds. Preservation of their tropical forest habitats appears to be the best means of maintaining the numbers and diversity of cuckoos, as well as a whole host of other forms of life.

Roadrunners have been persecuted because of their reputation as predators of the eggs and young of *Callipepla* quails. Early in the twentieth century, they were controlled in "chaparral drives", with a federal or state bounty on their heads. Feeding studies have shown, however, that they only rarely include quails in their diets, but they do take crop and household pests, as well as having some cultural status in the North American South-west (see Relationship with Man). Although they carry no official bounty, many Greater Roadrunners are still shot today, illegally, as targets and trophies.

Conservation of the host species which are heavily parasitized by cuckoos appears not to be a problem, in contrast to the situation with certain rare hosts that are parasitized by cowbirds in North America. In normal circumstances, the deteriorating habitat conditions for the host species would drive the cuckoos to local extinction well before the hosts themselves became seriously threatened as a result of cuckoo parasitism, since a population of parasitic cuckoos needs a large number of nesting hosts in order to maintain its numbers from one generation to the next.

Cuckoos depend mainly on insects, especially caterpillars, for their food, and the brood parasites depend on their host populations to rear their young. Environmental disturbances which lead to the reduction of host populations may result in the loss of parasitic cuckoos, and disturbances which lead to the reduction of wooded habitats and insects may also cause a decrease in other cuckoos as well.

Cuckoos may be among the first birds to disappear from a habitat that is polluted by industrial and chemical waste, because their caterpillar prey accumulate toxins from chemical pollution, as well as from the conversion and storage of normal metabolic products. In the early 1970's, migratory cuckoos which killed themselves when they flew into television towers in North America had significant amounts of chlorinated hydrocarbons in their tissues. The concentrations of pesticide metabolites in Yellow-billed Cuckoos were higher in autumn than in spring, and were higher in autumn adults than in juveniles; the time and the context of such concentrations of toxins suggest, therefore, that the pesticides were acquired on the breeding grounds. Anis also are at risk from the pesticides that are applied to kill grasshoppers, their main food.

Finally, Greater Roadrunners have disappeared from urban areas and from the margins of roadways carrying much traffic, as well as suffering from predation and disturbance by feral and domestic dogs and cats around urban and rural areas. Roadrunners require extensive, undisturbed, open shrubby and grassy habitats with abundant populations of reptile and insect prey, and these are commonly destroyed with the development of agriculture, urbanization, and the fragmentation of expansive tracts of grassland and chaparral.

A few cuckoos, both brood parasites and nesting species, have been bred in captivity. These include the Great Spotted and Common Cuckoos, the Greater Roadrunner, and the Coral-billed Ground-cuckoo. They have not, however, been bred on a scale large enough to provide sufficient numbers of individuals for re-introduction into areas from which they have been lost in the wild.

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Subfamily CUCULINAE

Genus *CLAMATOR* Kaup, 1829

1. Jacobin Cuckoo

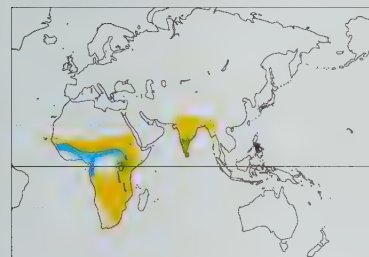
Clamator jacobinus

French: Coucou jacobin **German:** Jakobinerkuckuck **Spanish:** Críalo Blanquinegro
Other common names: Pied (Crested)/Black-and-white Cuckoo

Taxonomy. *Cuculus Jacobinus* Boddaert, 1783, Coromandel Coast. Along with *C. levaillantii* sometimes placed in separate genus *Oxylophus*, owing to differences in plumage and wing shape. Three subspecies recognized.

Subspecies and Distribution.

C. j. serratus (Sparrman, 1786) - S Africa.
C. j. pica (Hemprich & Ehrenberg, 1833) - sub-Saharan Africa S to Tanzania and Zambia, and NW India to Nepal and Myanmar, occasionally S Tibet, in foothills of Mt Everest.
C. j. jacobinus (Boddaert, 1783) - S India and Sri Lanka.



Descriptive notes. 34 cm; 66 g (India), 72 g (S Africa). Adult glossy black above with black crest, white patch on black wings and white tips to black tail; white below; iris brown, bill black, feet slate grey. Juvenile brown to sooty black above, whitish below with fulvous or grey on breast, tail spots buff (not white); iris pale yellow. Races differ in plumage and size: *jacobinus* smaller, *pica* larger, both unstreaked below; *serratus* larger, with two colour morphs, one variably greyish white to white below with streaked throat, the other, mainly in coastal S Africa, all glossy black with white wing patch and no white in tail. Voice. Loud ringing

"kleeuw, kleeuw, kleeuw", each note descending, repeated in series, by both sexes; males often follow with faster series of short rising notes, "kwik-kwik-kwik...", and call "kweek!". Often calls at night.

Habitat. Open woodland and scrub, dry thorn savanna, thorny jungle, plains. In India mainly in lowlands, plains and hills up to 2000 m, on migration to 4200 m in Himalayas; in Africa to 3000 m, but mainly below 1500 m.

Food and Feeding. Insects, mainly hairy caterpillars, also grasshoppers, mantids, termites; forest snails; eggs of host birds; berries. Feeds mainly in trees and bushes, also descends to ground and hops in search of food.

Breeding. Breeds in rains: in N India Jun-Aug, and in S Nilgiris Jan-Mar; in W Africa May-Jul; in Ethiopia Mar-Oct; in E Africa season coincides with the local rains, E of Rift Valley occurring Mar-May, from Rift westwards in Mar-Aug; in S Africa Nov-Mar. Brood-parasitic, with hosts mainly *Turdoides* babblers: in India Common Babbler (*T. caudatus*), Jungle Babbler (*T. striatus*) and Large Grey Babbler (*T. malcolmi*); in Mauritania, Kenya and Ethiopia Fulvous Chatterer (*T. fulvus*) and Rufous Chatterer (*T. rubiginosus*); in S Africa bulbuls (*Pycnonotus*, *Andropadus importunus*) and Fiscal Shrikes (*Lanius collaris*). Eggs blue in India, Sri Lanka and Africa N of 14° S, white in S Africa, rarely white in Mali and Kenya; 24 x 19 mm (India), 27 x 22 mm (S Africa); incubation 11-12 days. Nestlings either eject host's eggs or young or they monopolize food in nest, depending on host species; fledging 17-18 days.

Movements. An intra-African migrant in N and S, arriving on breeding grounds with rains and abundance of caterpillars. In far W Africa, breeds in Mauritania and migrates to Senegal and Gambia, where recent records are all in Nov-Dec; in Mali, present May-Oct; in Togo and Nigeria mainly seasonal, in N in Apr-Sept and in S in dry season; in savanna and forest edge in Gabon, juveniles appear as rare migrants in Dec. In E Africa a diurnal migrant, observed to move NW over Serengeti Plains in Feb-Mar. In S Africa, appears in E Cape in late Oct; moves towards more equatorial woodlands for dry season. Black morph *serratus* appears in austral winter N to Kenya, Ethiopia, Sudan and Chad, occasionally wanders to W Africa. Seasonal with the rains in India, occurring NE India May-Sept and disappearing early in dry season; present in C Myanmar May to early Nov. Nominate *jacobinus* from India winters in E and C Africa. Race *pica* nearly unknown in winter in Asia (one record Nepal), migrates to Africa, where not distinguishable from African *pica*: most Asian migrants move across Arabian Sea and Indian Ocean; more than 20 records in Oman and S Arabia, mainly in migration season; also observed on Seychelles during migration period.

Status and Conservation. Not globally threatened. Reported to be generally common, or at least not uncommon, throughout much of its extensive breeding range, e.g. common in parts of S India in Jul-Aug. No known threats to its numbers or habitats. May have an adverse impact on the breeding success of its host populations: e.g. 36% of Cape Bulbul (*Pycnonotus capensis*) nests were parasitized locally in S Africa.

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2. Levaillant's Cuckoo

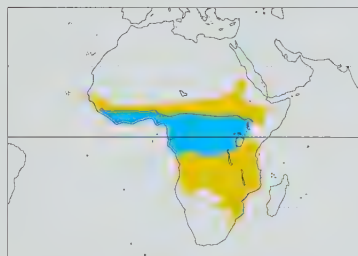
Clamator levaillantii

French: Coucou de Levaillant **German:** Kapkuckuck **Spanish:** Críalo Listado
Other common names: (African) Striped Cuckoo, Striped Crested Cuckoo

Taxonomy. *Coccyzus levaillantii* Swainson, 1829, Senegal.

Along with *C. jacobinus* sometimes placed in separate genus *Oxylophus*, owing to differences in plumage and wing shape. Formerly listed as *C. cafer*, but that species name was in fact applicable instead to *Cuculus clamosus*. Monotypic.

Distribution. Africa S of Sahara, breeding Sahel to E and S Africa. In non-breeding season ranges to C Africa and coastal W Africa.



Descriptive notes. 39 cm; 124 g. Adult glossy black above with black crest, white patch on black wings and white tips to black tail; white below, streaked black on throat and breast; iris brown, bill black, feet blue-grey; also rare melanistic morph in coastal E Africa, all black but for white wing patch and tail tips. Juvenile brown to rufous above, wings black with white patch, tail grey with paler tip; whitish below with dull brown on breast, some with black streaking on breast; iris pale grey, gape bright red-orange. Voice. Ringing "kuwu-weer, kuuu-weer..." often ending with rapid "kwik'kwik'kwik...", similar to *C. jacobinus* but longer, louder and harsher.

Juvenile begging call differs from that of host's young.

Habitat. Open woodland, wooded savanna, thickets, gardens, riverine forest, scrub, and even in forest canopy; often in humid habitats, in E Africa mainly in areas with more than 500 mm rainfall. Occurs at up to 2000 m in E Africa.

Food and Feeding. Insects, mainly hairy and spiny caterpillars, also winged termites, beetle larvae, grasshoppers. Foraging behaviour much as for *C. jacobinus*.

Breeding. Breeds mainly in rains: in Gambia Jun-Nov, in Sierra Leone Sept, in Ghana Feb-Jun, in Nigeria Apr-Sept (-Nov), in Ethiopia Jun-Sept, in Kenya Mar-May, in Malawi and Zimbabwe Dec-Apr (occasional young to June). Brood-parasitic: hosts mainly *Turdoides* babblers, including Brown Babbler (*T. plebejus*), Black-capped Babbler (*T. reinwardtii*), Arrow-marked Babbler (*T. jardineii*), Bare-cheeked Babbler (*T. gymnogenys*); also, fledged young fed by Chestnut-bellied Starling (*Spreo pulcher*). Eggs pale blue, in Nigeria pink with darker speckles, colour matches host eggs but surface texture more pitted than that of babblers' eggs; 26 x 21 mm; embryo develops for a day while egg in oviduct; incubation 12 days. Nestling does not evict; babbler host's young sometimes fledge from same nest as cuckoo; fledged cuckoo fed by foster parents for at least 36 days.

Movements. Intra-African migrant; seasonal in S Africa, resident or partly migratory in equatorial regions. Distinct black morph occurs Mar-Sept in coastal Kenya. Seen mainly in rainy season; in W Africa moves into northern woodlands with rains and into S Guinea woodlands for dry season, though in Sierra Leone some birds present in all habitats throughout year. In Gabon, non-breeders appear in dry season in Dec.

Status and Conservation. Not globally threatened. Generally not uncommon throughout range. Common and conspicuous parasitic cuckoo in Gambia and the upper R Niger in Mali during the rains; widespread and not uncommon in Sierra Leone. Locally common in S of range, but said to be rare in N Tanzania.

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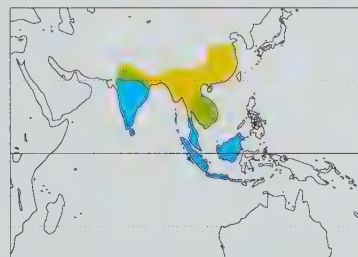
3. Chestnut-winged Cuckoo

Clamator coromandus

French: Coucou à collier **German:** Koromandelkuckuck **Spanish:** Críalo Oriental
Other common names: Chestnut-winged Crested/Red-winged (Crested) Cuckoo

Taxonomy. *Cuculus coromandus* Linnaeus, 1766, Coromandel. Monotypic.

Distribution. N India and Nepal E to S & E China and Indochina, S to S Myanmar (Tenasserim) Winters S to Greater Sundas.



Descriptive notes. 46 cm; 77 g. Adult metallic glossy black above, black crest, white nape, wings chestnut, tail black; chin to upper breast rusty, belly white; iris pale brown to dark brown to red, bill black with grey gonys, tarsi greyish green. Juvenile brown above with rufous buff feather edges, buff edge to wing-coverts, tail with buff tip and edge; white below; at 5 weeks brown crest with dark buff tip appears; moults to adult plumage at 3 months. Voice. Loud, harsh screech, "creech-creech-creech", and a hoarse whistle.

Habitat. Thick, low vegetation in wooded country, scrub and bushes, cultivated lands and vilt-

lages; also mangroves in winter and on migration. Occurs at altitudes of up to 2450 m.

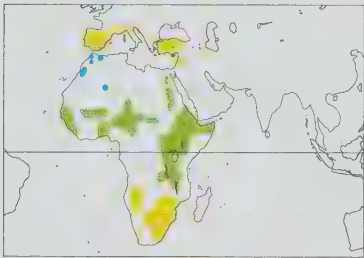
On following pages: 4. Great Spotted Cuckoo (*Clamator glandarius*); 5. Thick-billed Cuckoo (*Pachycoccyx audeberti*); 6. Sulawesi Hawk-cuckoo (*Cuculus crassirostris*); 7. Large Hawk-cuckoo (*Cuculus sparveroides*); 8. Common Hawk-cuckoo (*Cuculus varius*); 9. Moustached Hawk-cuckoo (*Cuculus vagans*); 10. Hodgson's Hawk-cuckoo (*Cuculus fugax*); 11. Philippine Hawk-cuckoo (*Cuculus pectoralis*).

Food and Feeding. Large insects, mainly caterpillars, beetles, mantids, ants, also spiders.
Breeding. Breeds in rains: in India Apr-Aug, in Sri Lanka Jun-Oct. Brood-parasitic: hosts mainly laughingthrushes (*Garrulax*). Eggs pale blue, unmarked, often more than one in a nest; 27 x 23 mm. Few other reliable data.
Movements. Seasonal in summer in China, Nepal and N Myanmar, where it arrives May and departs Oct; probably also only breeding visitor to N & C Thailand, wintering in peninsular Thailand and farther S; migrant in Malaysia. Resident in N India, S Vietnam and perhaps other parts of Indochina, and on Hainan; winters in C & S India, Sri Lanka, Malay Peninsula, Sumatra, Java and Borneo, occasionally to Bangka, N Sulawesi and the Philippines. Vagrant in Japan and Hong Kong.
Status and Conservation. Not globally threatened. Although population levels are inadequately known, species appears to be rather uncommon. It is very local in Nepal, but fairly common where it does occur. In Thailand it is uncommon at all seasons, and in Vietnam it is said to be rather rare. In its non-breeding range, this cuckoo is seen only occasionally in Borneo and Sumatra, and is rare in Java.
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4. Great Spotted Cuckoo
Clamator glandarius

French: Coucou geai German: Häherkuckuck Spanish: Críalo Europeo

Taxonomy. *Cuculus glandarius* Linnaeus, 1758, northern Africa and southern Europe = Gibraltar. A smaller race, *choragium*, has been described from S Africa, but breeding birds there overlap considerably in size with breeding birds in Mediterranean zone, and are not distinguishable. Monotypic.
Distribution. Iberian Peninsula, S France and W Italy; Turkey and Cyprus E to N Iraq and W Iran, and S through Middle East to Egypt; also sub-Saharan Africa from Senegal and Liberia E to Sudan, Eritrea, Ethiopia, N Somalia and Kenya, and S to Tanzania, Angola and South Africa. Virtually all populations winter in Africa; regular in small numbers in S Spain.



Descriptive notes. 35-39 cm; 124 g. Adult dusky brown above with white feather tips, flight-feathers grey-brown, tail tipped white, crown grey with slight crest, face blackish; throat buff, otherwise white below; eye-ring grey to reddish, iris brown, bill black, feet black. Juvenile has crown and face black, flight-feathers rufous, underparts more buffish; in 1st spring/summer, following arrested moult, intermediate plumage with mix of rufous and grey-brown flight-feathers. Voice. Harsh guttural "gah-gah-gah...gah-gah-gah...ko-ko-ko-ko", the series falling in pitch and increasing in tempo; also trilled "krrrrr" and cackled notes.

Habitat. Semi-arid open woodland, especially acacia thorn-scrub, also other scrub, rocky hillsides in dry savannas; also dry cultivation, e.g. in Middle East. In Europe favours savanna-like heathland, often with cork oak (*Quercus suber*) or stone pine (*Pinus pinea*), also olive groves. Mainly between 500 m and 2000 m.

Food and Feeding. Insects, mainly large hairy caterpillars, also termites, grasshoppers, moths and small lizards; dresses caterpillars by removing hairs before eating. Often feeds on ground.

Breeding. Breeding season late Apr to early Jun in Mediterranean; in Africa, breeds Mar in Egypt, Apr-May in Senegal and Sierra Leone, Apr-Jul in Mali, Ghana and Nigeria; in E Africa breeding varies with local rainy seasons, E of Rift in Apr and Oct-Dec, in arid NW in Feb-Apr; Oct-Jan in S Africa, Dec-Mar in Namibia, into Apr in Botswana. Brood-parasitic: hosts crows and magpies in Mediterranean, particularly Black-billed Magpie (*Pica pica*), Azure-winged Magpie (*Cyanopica cyanea*) and Carrion Crow (*Corvus corone*) in Spain, *C. corone* in Egypt, Pied Crow (*Corvus albus*) in Africa (Senegal, Sierra Leone, Mali, Nigeria, E Africa, S Africa); in W, E and S Africa, also starlings that nest in holes in trees (*Lamprolaima*), in rocks (*Onychognathus*) and in tunnels in sandy banks (*Spreo bicolor*). Female can lay 12-25 eggs in a season. Eggs pale greenish with brown and grey marks; 33 x 24 mm; do not vary with size or colour of host's eggs in Mediterranean; often several cuckoo eggs in one crow nest. Female may damage host's eggs by dropping its own egg on top; magpies sometimes remove cuckoo eggs from nest, crows do not. Incubation 12-15 days, shorter than host; chick naked, yellow or pink at hatching, gape pink, palate spicules not contrasting in colour; does not evict; reaches 50% of fledging weight 8 days after hatching; when more than one cuckoo chick in magpie nest, younger one may starve. Begging call somewhat like that of host species. Fledges in 19-26 days, fed by foster parents for further 25-59 days; fledglings form social groups and are attended by several magpies. Fledging success varies with time of laying, from 92% (eggs laid when host has only 1-3 eggs) to 10% (host's clutch complete); survival of young to independence 63%.

Movements. Adults leave breeding area in Spain in mid Jun, juveniles leave between early Jul and early Aug independently of adults. European birds mostly migrate to Africa, wintering N of 10°N, but possibly many move S of Sahara: small numbers winter in S Spain. Movements throughout range inadequately known, since breeding and non-breeding birds are indistinguishable. Birds in W Africa appear to be local migrants, though some are resident in Senegal; occurrence in Gambia irregular, involving mostly juveniles from farther N, but occasionally breeds; apparently random occurrence throughout much of Sierra Leone. Species is present locally in E Africa all year, and local migrants occur here as well, notably in passage across Serengeti Plains Jan-March. Local movements occur in relation to rains and aridity; birds S of Zambezi are mostly migratory, but a few remain all year in E Cape region of S Africa. In Israel/Palestine, local breeders arrive mid December to end of March, most having left by Jun, with passage of populations from farther N noted late Jan to end of May and Jul-Nov; occasional migrants recorded Arabia. Rare winter records from Middle East. Vagrant to Britain, N Europe and Russia.

Status and Conservation. Not globally threatened. Generally uncommon throughout most of its range, but conspicuous where it does occur. About 500 pairs estimated to breed in Israel/Palestine in 1980's. Species is expanding its range in S Europe and the Middle East, though has decreased in numbers in Egypt, where now rare as a breeding bird. Has also disappeared as a breeder from NW Africa. This species does not affect the success of young crows, but magpie chicks grow more slowly and fledge at lower weights in parasitized nests than in unparasitized ones.

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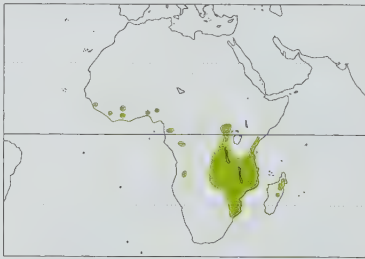
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Genus *PACHYCOCCYX* Cabanis, 1882

5. Thick-billed Cuckoo
Pachycoccyx audeberti

French: Coucou d'Audebert German: Dickschnabelkuckuck Spanish: Críalo Piquigrueso

Taxonomy. *Cuculus Audeberti* Schlegel, 1879, Ambodikilo, Antongil Bay, Madagascar. Three subspecies recognized.
Subspecies and Distribution.
P. a. brazzae (Oustalet, 1886) - Sierra Leone patchily through Ghana, Nigeria and Cameroon to Congo and W Zaïre.
P. a. validus (Reichenow, 1879) - E Zaïre to SE Kenya and Tanzania, and S through Malawi, Zambia, Zimbabwe and Mozambique to E Transvaal.
P. a. audeberti (Schlegel, 1879) - Madagascar.



Descriptive notes. 36 cm; 115 g. Adult uniform slate-grey above (brown in worn plumage), lores white, wings blackish, tail barred brown and black; white below; narrow eye-ring yellow, iris brown; bill all blackish, or with yellow/green or yellow-based lower mandible, or all yellow. Juvenile dark brown above with broad white spots on back and wing, face black and white. Race *audeberti* largest; *validus* smaller, lower mandible green-based; *brazzae* smaller, blacker above, no white on lores. Voice. Loud whistled "wheee-wheee-weep", like a goshawk (*Accipiter*); also a chattering "chee-cher-cher-cher".

Habitat. Miombo (*Brachystegia*) woodlands, lowland and riverine forests; more characteristic of rich miombo woodland than closed-canopy evergreen forest. In E Africa, in 500+ mm rainfall area.

Food and Feeding. Insects, mainly hairy caterpillars, marula worms, grasshoppers and mantids.

Breeding. Breeds Sept-Mar in Zimbabwe; few records elsewhere. Brood-parasitic: hosts Red-billed Helmet-shrike (*Prionops retzii*), in Zaïre once White-crowned Helmet-shrike (*P. plumata*); hosts unknown in Madagascar, but Chabert Vanga (*Leptopteryx chaberti*) suspected. Eggs pale blue-green with large brown, grey and lilac blotches; 24 x 17 mm; incubation 13 days. Nestling naked at hatching, skin orange, bill yellow, gape orange, yellow eye-ring by 18 days, does not resemble host's chicks; evicts host's eggs and nestlings; fledges in 28-30 days, fed for up to 50 days after.

Movements. Non-migratory, or with local seasonal movements. In Sudan, possible non-breeding visitor only in S. In Togo, rare resident; in Nigeria, resident near Kagara, where observed in all seasons.

Status and Conservation. Not globally threatened. Uncommon to rare throughout range, though regular in coastal forest of Kenya and locally in SE Zimbabwe; status uncertain in Sierra Leone, with 1-2 pairs reported from Gola Forest, but otherwise only three records. N nominate race, confined to Madagascar, was not seen for many years and was believed to be possibly extinct; but in 1992, at Maromiza forest near Périnet-Analamazaotra Special Reserve, one responded to playback of vocalizations recorded in Africa, giving calls nearly identical to those of the African bird. Further research is required on all three subspecies, to elucidate their true status.

Bibliography. Allport & Fanshawe (1994), Bannerman (1953), Benson & Benson (1977), Benson & Irwin (1972, 1973, 1980), Benson, Brooke *et al.* (1971), Benson, Colebrook-Robjent & Williams (1976-1977), Berlioz (1948), Britton (1980a), Brooke (1984a), Cave & Macdonald (1955), Cheke & Walsh (1996), Clancey (1985), Dowsett & Forbes-Watson (1993), Dyer *et al.* (1986), Elgood *et al.* (1994), Friedmann (1948a), Fry *et al.* (1988), Ginn *et al.* (1989), Grimes (1987), Jensen & Jensen (1969), King (1978/79), Langrand (1990), Langrand & Sinclair (1994), Lewis & Pomeroy (1989), Louette (1989), Mackworth-Præd & Grant (1957, 1962, 1970), Maclean (1993), Milon *et al.* (1973), Pinto (1983), Riddell (1994), Rowan (1983), Short *et al.* (1990), Snow (1978), Vernon (1971b, 1971c, 1984), Zimmerman *et al.* (1996).

Genus *CUCULUS* Linnaeus, 1758

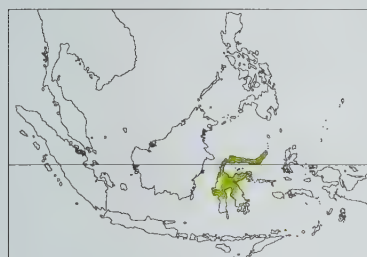
6. Sulawesi Hawk-cuckoo
Cuculus crassirostris

French: Coucou des Célèbes German: Minahassakuckuck Spanish: Cuco de Célebes
Other common names: Celebes Hawk-cuckoo

Taxonomy. *Hierococcyx crassirostris* Walden, 1872, northern Sulawesi.

Often placed in genus *Hierococcyx*, along with other hawk-cuckoos, on grounds of notable morphological differences from *Cuculus*. Monotypic.

Distribution. Mountains of N & C Sulawesi.



Descriptive notes. 34 cm. Adult grey-brown above, outer wing not banded, head grey; white below with black bars; tail barred black, rufous and white; eye-ring yellow, iris dark brown; bill brown to black with greenish base; feet yellow. Juvenile more rufous above, head black; buffy-white below. **Voice.** Far-carrying "to-ko-kuu" or "ka-ka-ku", first syllable sometimes omitted, second higher and louder than third; heard at dawn and dusk, also at midnight.

Habitat. Primary montane forest at 500-1400 m.

Food and Feeding. Insects, including termites.

Breeding. No information.

Movements. Apparently resident. Presumably

some local dispersive movements.

Status and Conservation. Not globally threatened. Generally uncommon, with density of under 1 individual/km, where it occurs; frequently heard at various sites in primary forest of Dumoga-Bone National Park in mid-1980's. Because of its restricted range, was formerly considered near-threatened. Owing to its secretive habits, this species, like other hawk-cuckoos, can be difficult to observe, but its loud voice may be a better clue to its possible presence. It seems unlikely, therefore, that it is any commoner than current fieldwork suggests.

Bibliography. Andrew (1992), van den Berg & Bosman (1986), Coates & Bishop (1997), Holmes & Philipps (1996), Inskipp *et al.* (1996), Jepson (1997), Rozendaal & Dekker (1989), Stresemann (1940), Sujatnika *et al.* (1995), Watling (1983), Wheatley (1996), White & Bruce (1986).

7. Large Hawk-cuckoo

Cuculus sparverioides

French: Coucou épervier

German: Sperberkuckuck

Spanish: Cuco Grande

Other common names: Brain-fever Bird

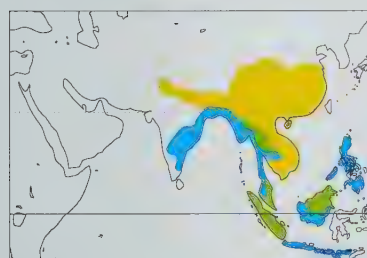
Taxonomy. *Cuculus sparverioides* Vigors, 1832, Himalayas.

Often placed in genus *Hierococcyx*, along with other hawk-cuckoos, on grounds of notable morphological differences from *Cuculus*. Two subspecies recognized.

Subspecies and Distribution.

C. s. sparverioides Vigors, 1832 - Himalayas from N Pakistan and India to Nepal, Naga Hills and Manipur, whence E to China (Sichuan and lower Yangtze valley), and S to Myanmar, Thailand and Indochina; winters mainly from Bangladesh and Thailand S to S & E India and Greater Sundas, and E to Philippines.

C. s. bocki (R. G. W. Ramsay, 1886) - mountains of Malaysia, Sumatra and Borneo.



Descriptive notes. Nominata 38-40 cm; 150 g. Adult brown above, ashy-grey on crown, nape and neck, tail barred brownish grey and black; chin black, throat white and breast more rufous, both dark-streaked, belly white with blackish bars; eye-ring yellow, iris orange to buff, bill blackish above and greenish slate below. Subadult streaked below. Juvenile barred rufous and brown above, forehead grey, nape white, tail barred rufous and black; buff below, streaked with blackish teardrops. Race *bocki* considerably smaller, with narrow rufous bars above, throat unstreaked, rufous breast often unstreaked.

Voice. In breeding season, calls in mornings and at sunset into night, a loud, shrill screaming whistle, "brain fe-ver" or "pi-pee-ha", increasing in speed and pitch to frantic climax. Song may differ between the two races.

Habitat. Deciduous and evergreen wooded areas, especially with oaks, also in pine woods in Sumatra, mostly at higher elevations; on passage and in winter, also in mangroves, gardens, often at lower levels. Breeds at 900-2700 m in Indian subcontinent, to 3000 m in Nepal, 900-1600 m in Sumatra, and in mountains above 1000 m in Borneo.

Food and Feeding. Insects, mainly caterpillars; also crickets, grasshoppers, beetles, bugs, roaches, ants and spiders; also berries. Forages solitarily in trees, where remains in canopy.

Breeding. Breeds Jun-Jul in W Himalayas, Apr-Jun in Assam. Brood-parasitic: hosts in India laughingthrushes (*Garrulax*), also Large Spiderhunter (*Arachnothera magna*), Nepal Shortwing (*Brachypteryx leucophrys*), in Sumatra, Chestnut-capped Laughingthrush (*Garrulax mitratus*). Eggs (1) light brownish olive, seldom with darker specks, (2) blue; 27 x 19 mm. Few other reliable data.

Movements. Race *bocki* resident. Race *sparverioides* mainly migratory: most individuals, at least from N of range and in most of China, move S to winter from peninsular India, Bangladesh, Thailand and Peninsular Malaysia, through the Greater Sundas (scarce Sumatra; rare Java, Bali, Borneo), to the Philippines; resident in Hainan, N Thailand and probably E Myanmar. Apparently only a vagrant to N Sulawesi.

Status and Conservation. Not globally threatened. Common or fairly common breeder in many parts of range, notably Thailand, Nepal and Borneo, but scarce in Sumatra; rare and local passage and winter visitor in Philippines.

Bibliography. Ali & Ripley (1981), Ali *et al.* (1996), Baker (1906-1907, 1907), Becking (1981), Cheng Tsohsin (1987), Coates & Bishop (1997), Deignan (1945), Dickinson *et al.* (1991), Étiénnepour & Hùe (1978), Fan Qiangdong (1988), Holmes (1996), Lekagul & Round (1991), MacKinnon & Philipps (1993), Madoc (1976), van Marle & Voous (1988), Mason (1990), Medway & Wells (1976), Osmaston (1916), Parkes (1973), Ripley (1982), Roberts, T.J. (1991), Robinson *et al.* (1924), Schönwetter (1967), Smythies (1981, 1986), Sody (1989), Stepanyan (1990b, 1991, 1995), Thompson *et al.* (1993), White & Bruce (1986).

8. Common Hawk-cuckoo

Cuculus varius

French: Coucou shikra

German: Wechsellkuckuck

Spanish: Cuco Chikra

Other common names: Ceylon Hawk Cuckoo, Brain-fever Bird

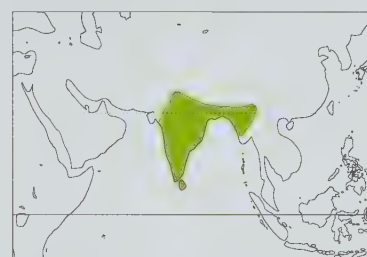
Taxonomy. *Cuculus varius* Vahl, 1797, Tranquebar, India.

Often placed in genus *Hierococcyx*, along with other hawk-cuckoos, on grounds of notable morphological differences from *Cuculus*. Two subspecies recognized.

Subspecies and Distribution.

C. v. varius Vahl, 1797 - India, Nepal, Bangladesh and Myanmar.

C. v. cicellae (Phillips, 1949) - Sri Lanka.



Descriptive notes. 33 cm; 104 g. Adult ashy brownish grey above, paler on head, tail with 3-5 whitish and black bars and light rufous tip; white below, with pale rufous breast and bars on abdomen and flanks; eye-ring pale grey, iris yellow, bill yellowish above and greenish below, feet yellow. Differs from *C. sparverioides* in smaller size, less distinct barring below, and voice. Juvenile, barred dull rufous above, tail lacks whitish; brown-streaked buffy-white below. Race *cicellae* darker, and with barred breast. **Voice.** Loud shrieking "brain fé-ver" or "wee-piwhit", in runs of 4-6, becoming higher and louder, more shrill than *C. sparverioides*; female

gives strident trilling scream. Often sings at night, with bright moon.

Habitat. Wooded country, in deciduous and semi-evergreen forests, gardens, groves of cultivated trees. In both plains and hill country, below 1000 m in Nepal.

Food and Feeding. Insects, mainly caterpillars and cutworms, also grasshoppers, locusts, winged termites, ants; lizards; fruits of wild banyan fig, berries. Arboreal and secretive forager.

Breeding. Breeds Mar-Jul in India, Jan-Apr in Sri Lanka. Brood-parasitic: hosts babblers, including Jungle Babbler (*Turdoides striatus*) and laughingthrushes (*Garrulax*). 2 oviduct eggs were blue, 27 x 20 mm. Young evicts host's chicks. Call of fledged juvenile "ke-ke", like that of babbler.

Movements. Mostly resident; also partially migratory at higher altitudes and in drier habitats. Single vagrants Oman and Thailand.

Status and Conservation. Not globally threatened. Common on the plains of India, where characteristic call is amongst the most widely known of bird sounds; also common in Nepal, but rare in Sri Lanka; status in Bangladesh and Myanmar uncertain.

Bibliography. Ali (1996), Ali & Ripley (1981), Ali & Whistler (1937), Ali *et al.* (1996), Baker (1906-1907), Becking (1981), Foster (1989), Grewal (1995), Harvey (1990), Henry (1971), Himmatsinhi (1980), Inskipp, C. & Inskipp (1991), Inskipp, T. *et al.* (1996), Kotagama & Fernando (1994), Legge (1880), Lushington (1949), Mahabal & Lamba (1987), Majumdar *et al.* (1992), Meston (1942), Mukherjee (1995), Phillips (1948, 1978), Ripley (1982), Roberts, T.J. (1991), Saha & Dasgupta (1992), Schönwetter (1967), Smythies (1986), Wijesinghe (1994).

9. Moustached Hawk-cuckoo

Cuculus vagans

French: Coucou à moustaches

German: Bartkuckuck

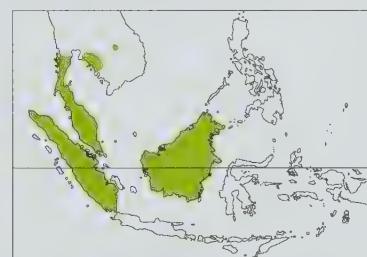
Spanish: Cuco Bigotudo

Other common names: Lesser/Small/Dwarf Hawk-cuckoo

Taxonomy. *Cuculus vagans* S. Müller, 1845, Java.

Often placed in genus *Hierococcyx*, along with other hawk-cuckoos, on grounds of notable morphological differences from *Cuculus*. Monotypic.

Distribution. S Myanmar and Mergui Archipelago, S Thailand, S through Peninsular Malaysia to Sumatra and Borneo; recent records from S Laos.



Descriptive notes. 26 cm; 56 g. Adult dark brown above, crown dark grey, cheek and throat whitish, broad black moustache, tail barred grey and black, wings barred lighter brown; inner webs of inner flight-feathers and coverts whitish, form pale patch from above in flight; whitish below with dark streaks; eye-ring yellow, iris dark brown; bill blackish above, base greenish, yellow-green below; feet yellow. Juvenile has crown brown. **Voice.** Two-syllable phrase, "kang koh", repeated every 2 sec; also mellow whistle, "peu peu", ascending on scale to sudden stop.

Habitat. Forest edge and secondary forest, especially lower hill slopes and lowlands, alluvial

forest, bamboo forest. In Thailand, from plains to 900 m.

Food and Feeding. Insects.

Breeding. In Malaysia, singing peaks in Feb and a juvenile seen in Jul. Brood-parasitic: hosts unknown. No information on breeding biology.

Movements. Resident and partially migratory; details unknown.

Status and Conservation. Not globally threatened. Like all forest species, may be vulnerable to further deforestation as is the case in Thailand, where species is considered an uncommon resident. Rare in Sumatra and Borneo, and only occasional vagrant to W Java. Recent observations of this species in Laos may possibly indicate slight range expansion, but equally may be due to better coverage.

Bibliography. Andrew (1992), Duckworth (1996), Gibson-Hill (1949), Holmes (1996), Holmes & Burton (1987), Inskipp *et al.* (1996), Lekagul & Round (1991), MacKinnon (1988), MacKinnon & Philipps (1993), van Marle & Voous (1988), Medway & Wells (1963, 1976), Rajathurai (1996), Round (1988), Smythies (1981, 1986), Thewlis *et al.* (1996), Wilkinson, Dutson & Sheldon (1991), Wilkinson, Dutson, Sheldon, Noor & Noor (1991).

10. Hodgson's Hawk-cuckoo

Cuculus fugax

French: Coucou fugitif

German: Fluchtkuckuck

Spanish: Cuco Huidizo

Other common names: Fugitive/Horsfield's Hawk-cuckoo

Taxonomy. *Cuculus fugax* Horsfield, 1821, Java.

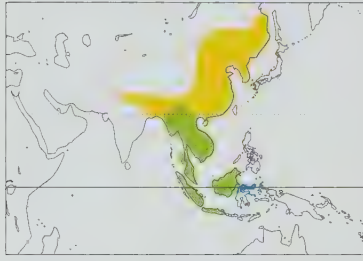
Often placed in genus *Hierococcyx*, along with other hawk-cuckoos, on grounds of notable morphological differences from *Cuculus*. Forms a superspecies with *C. pectoralis*, with which often considered conspecific (see page 512). Three subspecies recognized.

Subspecies and Distribution.

C. f. niscolor Blyth, 1843 - Nepal and E Himalayas to Myanmar, Thailand, Annam and Hainan; winters S to Sumatra, Java and Borneo.

C. f. fugax Horsfield, 1821 - S Thailand, Peninsular Malaysia, Sumatra, Java and Borneo.

C. f. hyperythrus Gould, 1856 - Sichuan E to NE China and Ussuriland (Sikhote-Alin), and S to Korea, S Japan (Hondo) and lower Yangtze valley; migrates to S China, SE Asia, Borneo and Sulawesi.



Descriptive notes. 28-30 cm; 83 g. Adult slate-grey above, wings brownish, inner webs of inner flight-feathers and coverts white barred grey-brown and inner secondaries unbarred pale grey (form pale patch from above in flight), tail banded grey and black with broad black subterminal bar and rufous and white tip; white moustache and supraloral area; whitish below, streaked with rufous and brown, chin grey, throat white, flanks light rufous, undertail-coverts white; eye-ring yellow, iris yellow, bill yellow with black tip to greenish to black, feet yellow. Subadult dark grey above, barred rufous, crown black with buff feather tips; whitish below with

rufous-edged dark brown spots or streaks. Juvenile with upperpart feathers edged buff, tail with broader white tip; streaked and spotted black below; eye-ring yellow, iris grey (some with brown ring), bill black. Race *fugax* large-billed, with most rounded wingtip; *nisicolor* smaller-billed, wing more pointed, whitish below with pale rufous-brown streaks; *hyperythrus* largest-bodied, wing more pointed, white nape patch, breast and belly pale rufous with very fine grey streaks. VOICE. Calls through night, shrill "gee-whizz, gee-whizz", first note higher-pitched than second, repeated up to 20 times, and rapid sequence of shrill "pee" notes rising up scale and dropping at end.

Habitat. Deciduous semi-evergreen and evergreen forests, secondary forest, damp ravines covered with conifers, bamboo thickets and plantations. Breeds 600-1800 m in India, to 1000 m in Myanmar, to 1400 m in Sumatra, to 2300 m in Japan, to 2800 m in Borneo.

Food and Feeding. Insects, mainly caterpillars, cicadas, beetles, also fruits and berries. Active in bushes and understorey.

Breeding. Oviduct egg in Jun (Sikkim); possibly Jun-Sept. Brood-parasitic: hosts in India are Nepal Shortwing (*Brachypteryx leucophrys*) and Small Niltava (*Niltava macgrigoriae*); in Borneo Black-throated Babbler (*Stachyris nigricollis*); in Japan include Blue Chat (*Eritacus cyane*). Eggs uniform olive-brown to green, darker at large end, 24 x 16 mm (India and Sikkim); pale blue, 28 x 20 mm (Japan).

Movements. Migratory in N part of range, races *nisicolor* and *hyperythrus* almost entirely vacating their breeding ranges to winter S to Sumatra, Java and Borneo, where overlap occurs with resident *fugax*. Migrant through Peninsular Malaysia, and also recorded on passage through Korea. Recently recorded on Bali, where status uncertain.

Status and Conservation. Not globally threatened. This species is considered uncommon in Japan and China, uncommon in Thailand, and rare in Vietnam and in Java. Clearly rare also in Nepal, with only two records. Few records known from Myanmar, and species only occasionally reported from Borneo but said to be locally common in Bornean mountains. May be common in Peninsular Malaysia. Although the species has been recorded recently in Bali, it is not certain whether this involves breeding or wintering.

Bibliography. Ali & Ripley (1981), Baker (1906-1907), Becking (1981), Brazil (1991), Coates & Bishop (1997), Cranbrook & Wells (1981), Deignan (1945), Dementiev & Gladkov (1951a), Échécopar & Hùe (1978), Fiebig (1995),

Flint *et al.* (1984), Gore & Pyong-Oh (1971), Higuchi & Sato (1984), Inoue (1949, 1958), Junge (1948), Knystautas (1993), Lekagul & Round (1991), Li (1991), MacKinnon & Phillipps (1993), van Marle & Voous (1988), Mayr (1938), Medway & Wells (1976), Mees (1986), Ripley (1942, 1944, 1982), Robinson *et al.* (1924), Siebers (1930), Smythies (1981, 1986), Sody (1989), Stepanyan (1990a, 1995), Thewlis *et al.* (1996), Thompson (1966), Tomek (1985).

11. Philippine Hawk-cuckoo

Cuculus pectoralis

French: Coucou des Philippines

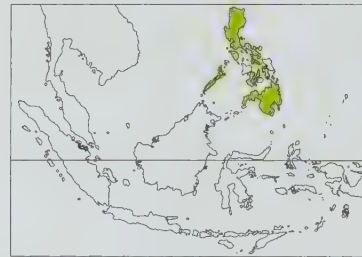
German: Philippinenkuckuck

Spanish: Cuco Filipino

Taxonomy. *Hiracoccyx pectoralis* Cabanis and Heine, 1863, Philippines.

Often placed in genus *Hierococcyx*, along with other hawk-cuckoos, on grounds of notable morphological differences from *Cuculus*. Forms a superspecies with *C. fugax*, with which often considered conspecific (see page 512). Monotypic.

Distribution. Philippines, on Palawan, Luzon, Mindoro, Sibuyan, Cebu, Negros, Leyte and Mindanao.



Descriptive notes. 28 cm; 80 g. Adult slate-grey above, white loreal streak, wings round-tipped, brownish, inner webs of inner flight-feathers and coverts white barred grey-brown and inner secondaries unbarred pale grey (form pale patch from above in flight), tail banded grey and black with broad subterminal black band and rufous tip; chin grey, throat white, breast bright rufous (with or without fine grey streaks), belly and undertail-coverts white; eye-ring yellow, iris yellow to brown, bill black above, olive below, feet yellow. Subadult barred rufous on back and wings, chin white, white below with rufous-edged black teardrop streaks, tail barred grey,

brown and rufous. Juvenile with head blackish with buff feather edges, nape white, chin streaked, rufous wash on chest, iris pale brown. VOICE. Series of short crescendo calls rising and falling in pitch, each phrase of 6-8 notes/sec, also prolonged crescendo call rising then falling, unlike *C. fugax* (Thailand and Malaysia).

Habitat. Forest: virgin mossy to dipterocarp. Up to 2400 m.

Food and Feeding. Insects, mainly caterpillars, also berries.

Breeding. Virtually unknown. Females may lay in subadult plumage. Brood-parasitic: hosts unknown.

Movements. Resident.

Status and Conservation. Not globally threatened. An uncommon to rare resident of dense original forest, a habitat which is rapidly disappearing throughout the Philippines. Although species is not currently considered threatened, this may perhaps be due partly to fact that up to now this form has not been recognized as a species distinct from *C. fugax*; survey work recommended.

Bibliography. Baud (1976), Danielsen *et al.* (1994), Dickinson *et al.* (1991), DuPont (1971, 1972a), Gonzales (1983), Goodman & Gonzales (1990), Goodman *et al.* (1995), Mayr (1938), McGregor (1909-1910), Parkes (1973), Rand (1951), Rand & Rabor (1960), Ripley & Rabor (1958), Siebers (1930).



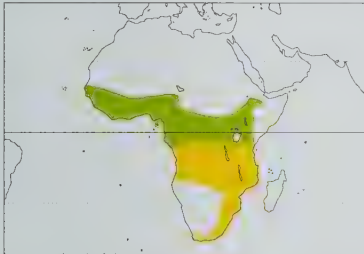
12. Red-chested Cuckoo

Cuculus solitarius

French: Coucou solitaire German: Einsiedlerkuckuck Spanish: Cuco Solitario

Taxonomy. *Cuculus solitarius* Stephens, 1815, eastern Cape Province. Population on Bioko (Fernando Póo), off Cameroon, sometimes treated as separate race *magnirostris*, on account of larger bill, but shows no other differences and probably does not merit recognition. Monotypic.

Distribution. Senegal through Nigeria to S Sudan and Ethiopia, and S through Zaire, Angola, Zambia, Zimbabwe and Mozambique to S South Africa; Bioko.



Descriptive notes. 31 cm; 75 g. Adult male dark grey above, tail tipped white; chin grey, breast rufous (often dark-barred), upper belly barred black and white, undertail-coverts unbarred whitish; eyelids yellow-green, iris brown, bill black with yellow base, feet yellow. Female often has throat buffy, sometimes pale grey, but never barred; breast usually paler rufous and always barred. Juvenile blackish above with white feather margins, throat to upper breast black with white feather margins, belly barred black and white, tail black with white spots and tip, eye black, bill black, feet orange. Voice. Loud, emphatic 3-note song, dropping in pitch, “piet-my-vrow!” or “IT-will-rain!”; female call a loud “kwik-kwik-kwik-kwik!”. Often sings at night.

Habitat. Forest, open woodland, riparian woodland, thorn scrub, and in montane areas to 3000 m. A forest bird in W, C & S Africa, but more of an open woodland bird in E Africa, where mainly above 1000 m and within 500+ mm rainfall areas; also breeds in semi-arid acacia savanna.

Food and Feeding. Insects, mainly hairy caterpillars, also beetles, grasshoppers, spiders, slugs, centipedes, millipedes, snails; also small frogs and lizards, berries.

Breeding. Breeds in early rains: calls in S Senegal and Gambia in Jun-Aug; breeds Mar-May in E Africa (varies with rains), possibly Apr–Jul in Ethiopia, Oct-Jan in S Africa. Brood-parasitic; hosts mainly thrushes, robins and alethes. Eggs unspotted chocolate-brown in S & E Africa where robin-chats (*Cossypha*) parasitized, blue with fine brown spots for other hosts, especially scrub-robins (*Erythropgyia*) in E Africa; 22 x 18 mm; incubation 12–14 days. Nestling hatches naked, skin dark brown, inside of mouth yellow, darkening to orange, feet yellow; evicts host's eggs and chicks; fledges in 17–21 days.

Movements. Intra-African migrant. Migratory in S part of range, arriving in Malawi and S Africa in Sept and leaving in Mar; perhaps migratory in W Africa, especially Nigeria, where it moves from coastal areas during rains to the N savannas.

Status and Conservation. Not globally threatened. Generally common in forests and woodlands throughout extensive range. Apparently widespread and common in much of E Africa, and a common summer visitor in S Africa. No threats known at present.

Bibliography. Amadon (1953), Archer (1985), Bannerman (1953), Beattie (1981), Benson & Benson (1977), Benson *et al.* (1971), Britton (1980a, 1980b), Cave & Macdonald (1955), Cheke & Walsh (1996), Christy & Clarke (1994), Colston & Curry-Lindahl (1986), Desfayes (1975), Dowsett & Forbes-Watson (1993), Dowsett-Lemaire (1996), Elgood, Fry & Dowsett (1973), Elgood, Heigham *et al.* (1994), Friedmann (1930a, 1948a, 1956, 1967), Fry *et al.* (1988), Fuggle (1980), Fuggles-Couchman (1981), Ginn *et al.* (1989), Gore (1990), Grimes (1987), Grobler & Steyn (1980), Hockey *et al.* (1989), Howell *et al.* (1980), Jackson & Sclater (1938), Jensen & Jensen (1969), Lewis & Pomeroy (1989), Lippens & Wille (1976), Liversidge (1955), Mackworth-Præd & Grant (1957, 1962, 1970), Maclean (1993), Maclean & Maclean (1993), Marshall (1984), Mundy (1986), Nikolaus (1987), Oatley (1970, 1980), Penry (1994), Pérez del Val (1996), Pinto (1983), Pitman (1964), Prins (1989), Reed (1969), Rowan (1983), Short *et al.* (1990), Skead (1951), Skinner (1978), Snow (1978), van Someren (1956), Steyn & Myburgh (1980), Wachter *et al.* (1997), Zimmerman *et al.* (1996).

13. Black Cuckoo

Cuculus clamosus

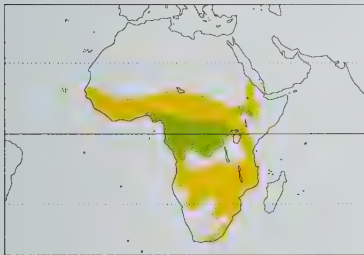
French: Coucou criard German: Schwarzkuckuck Spanish: Cuco Negro

Taxonomy. *Cuculus clamosus* Latham, 1801, Cape of Good Hope = Cradock. Formerly listed as *C. cafer*, but that name was officially suppressed, largely due to confusion with *Clamator leuallantii*. Birds from S Ethiopia to Uganda, W Kenya and NW Tanzania sometimes separated as “*jacksoni*”, but they in fact represent an intermediate or intergrade population. Two subspecies recognized.

Subspecies and Distribution.

C. c. gabonensis Lafresnaye, 1853 - Liberia, Ghana, Nigeria and N Zaire E to S Sudan, Uganda and W Kenya.

C. c. clamosus Latham, 1801 - Ethiopia, E & C Kenya, Tanzania, S Zaire and Angola S to NE Namibia, Zimbabwe and E South Africa; migrates to equatorial W Africa, where recorded irregularly W to Senegambia.



Descriptive notes. 31 cm; 85 g. Adult black above, glossed greenish blue, tail tipped white; iris brown, bill black. Juvenile duller, lacks white tail tip. Races differ in underpart coloration: *clamosus* black below, some with buffish barring (often considered a character typical of females, but extensive examination of specimens does not support this); *gabonensis* has chin to breast rufous with darker bars, remainder of underparts banded black and buff, undertail-coverts often unbarred on male, female with rufous darker, ear-coverts dark (not rufous), breast and belly more heavily barred blackish, often continuing onto undertail-coverts; birds in W Kenya

(“*jacksoni*”) and Uganda are intermediate between *clamosus* and *gabonensis*. Voice. Loud, mournful slow whistle, “whooh whooh whee”, second note shorter and higher, third rising one third of an octave; in aggressive contexts a harsh crescendo “gagagaGAGAGA!”, rising in pitch to a climax, then dropping in pitch and volume; female call “kwik-kwik-kwik-kwik!”. Songs are same throughout species' entire range.

Habitat. Forest, open woodland, riparian woodland, acacia thicket. In S Africa occurs in open woodlands and suburban gardens and avoids evergreen forest and thicket, in E Africa avoids the arid areas, and is a forest bird in C & W Africa. Lowlands, generally below 2000 m.

Food and Feeding. Insectivorous, taking mainly hairy caterpillars, also termites, grasshoppers, beetles; also eats birds' eggs and nestlings.

Breeding. Breeds Oct-Dec in S Africa, Mar-Apr in Tanzania; few breeding records C & W Africa, none W of Cameroon, and unknown whether black forms in W Africa breed there. Brood-parasitic; hosts mainly bush-shrikes, e.g. Boubou Shrike (*Laniarius aethiopicus*), Crimson-breasted Shrike (*L. atrococcineus*) in S Africa. Female lays up to 22 eggs in a season. Eggs whitish or pale green with reddish brown marks, similar to eggs of boubous; 25 x 19 mm; incubation 14 days. Nestling hatches naked, pale brownish pink skin (darkens to purplish black), inside of mouth pink; fledges in 20–21 days.

Movements. Race *gabonensis* is sedentary in forests in W & C Africa. Race *clamosus* is migratory in S Africa, where it sings and is present mainly Sept-Dec but also remains until Mar; migrates to equatorial and W Africa N of the forest zone, where may breed irregularly; present mainly Mar-Nov in Sierra Leone, where race *gabonensis* unknown; occurs in all months locally in E Africa.

Status and Conservation. Not globally threatened. Generally common resident in forests in lower Guinea region of W Africa and equatorial C & E Africa; common breeding visitor in areas of open woodland in S Africa. Often overlooked when present and not breeding, e.g. in NW Zambia in Sept.

Bibliography. Bannerman (1953), Benson & Benson (1977), Benson *et al.* (1971), Britton (1980a), Brown & Britton (1980), Cave & Macdonald (1955), Chapin (1939), Cheke & Walsh (1996), Christy & Clarke (1994), Colston & Curry-Lindahl (1986), Dowsett & Forbes-Watson (1993), Dowsett-Lemaire (1996), Elgood, Fry & Dowsett (1973), Elgood, Heigham *et al.* (1994), Friedmann (1930a, 1948a, 1956, 1966, 1967), Fry *et al.* (1988), Ginn *et al.* (1989), Grimes (1987), Hockey *et al.* (1989), Jensen & Clinning (1974), Jensen & Jensen (1969), Lewis & Pomeroy (1989), Lippens & Wille (1976), Lockhart (1996), Louette & Herroelen (1993), Mackworth-Præd & Grant (1957, 1962, 1970), Maclean (1993), Markus (1965), Payne (1973, 1974), Penry (1976, 1994), Pinto (1983), Pryce (1989), Rowan (1983), Short *et al.* (1990), Skead (1951), Snow (1978), Sweet (1994), Zimmerman *et al.* (1996).

14. Indian Cuckoo

Cuculus micropterus

French: Coucou à ailes courtes German: Kurzflügelkuckuck Spanish: Cuco Alicorto

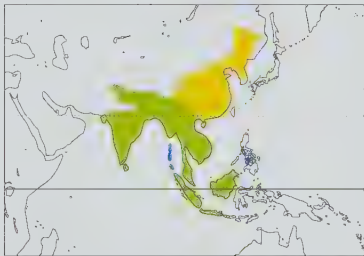
Other common names: Short-winged Cuckoo

Taxonomy. *Cuculus micropterus* Gould, 1837, Himalayas. Two subspecies recognized.

Subspecies and Distribution.

C. m. micropterus Gould, 1837 - Kashmir and Himalayan foothills S through India to Sri Lanka, and E through Nepal, Bangladesh, Myanmar and Thailand to E China, Mongolia, Korea and Russian Far East; winters S to Andaman and Nicobar Is, Peninsular Malaysia, Sumatra, Java, Borneo and Philippines.

C. m. concretus S. Müller, 1845 - Vietnam, S Thailand, Peninsular Malaysia, Sumatra, Java and Borneo.



Descriptive notes. 32–33 cm; 119 g. Adult male dark slate-grey above, back tinged brownish, tail barred white at sides and with broad black subterminal band; pale ashy and white below with widely spaced black bands; eye-ring grey to yellow, iris brown, bill black above, greenish with yellow base below, feet yellow. Female with throat pale grey and breast brownish. Juvenile broadly tipped with rufous and white above, head and neck broadly barred white, tail more rufous; black-barred buff below. Race *concretus* smaller. Voice. Loud, flute-like, hollow 4-note whistle, final note lower-pitched, “orange-pekoee” or “crossword puzzle”.

Habitat. Deciduous and evergreen forests, second growth, dry country. Lowlands to hills at 2000 m, sometimes to 2800 m; in Nepal to 2100 m, occasionally higher, to 3700 m.

Food and Feeding. Insects, mainly hairy caterpillars, also butterflies, grasshoppers, ants; fruit. Forages in high canopy, but sometimes feeds on ground.

Breeding. Calls May-Jul in India, Jan-May in Sri Lanka, Jan-Aug in Malaysia. Brood-parasitic; hosts in India drongos, e.g. Black Drongo (*Dicrurus macrocercus*) and Grey Drongo (*D. leucophaeus*); in China *D. macrocercus* and Azure-winged Magpie (*Cyanopica cyanea*); in Russia Brown Shrike (*Lanius cristatus*); in Malaysia fledglings (not definitely of this species) fed by Black-and-yellow Broadbills (*Eurylaimus ochromalus*); in Java Greater Racquet-tailed Drongo (*D. paradiseus*). Eggs whitish with reddish brown markings, 25 x 19 mm (Lower Amur); blue eggs in India suspected to be from this cuckoo; incubation 12 days (14 days with shrikes). Nestling naked at hatching, 4–7–4–9 g, skin yellowish pink, gape flange yellow, mouth-lining orange-red; begging call resembles that of host's nestlings.

Movements. Resident in S part of range. Summer visitor in N of range and in most of temperate Asia; passage migrant in Korea, possibly breeding in places where remains and sings in Jun; migrates to winter in tropical S Asia, including Andaman Is and Greater Sundas, also Philippines. Apparently only accidental in Japan and also in NE Pakistan.

Status and Conservation. Not globally threatened. Fairly common throughout year in Thailand; widespread in Myanmar, where it appears to be more numerous in the higher hills. Uncommon in Sumatra and Borneo, and rare in Java; uncommon in dry country in Sri Lanka, where occurs mainly in winter, but also sings and may breed. In the Philippines, rare on migration and in winter. Also recorded on Bangka, and one record from N Moluccas, on Ternate.

Bibliography. Ali & Ripley (1981), Ali *et al.* (1996), Baker (1906–1907, 1907, 1908), Becking (1981), Brazil (1991), Coates & Bishop (1997), Colebrook-Robjent (1978), Cranbrook & Wells (1981), Deignan (1945), Dickinson *et al.* (1991), Étiépcap & Hùe (1978), Fiebig (1995), Flint *et al.* (1984), Gore & Pyong-Oh (1971), Harvey (1990), Hellebrekers & Hoogerwerf (1967), Jones (1941), Knystautas (1993), Lekagul & Round (1991), MacKinnon & Phillips

(1993), Madoc (1976), Majumdar *et al.* (1992), van Marle & Voous (1988), Medway & Wells (1976), Mees (1986), Narayan & Rosalind (1991b), Neufeldt (1966), Osmaston (1916), Phillips (1978), Ripley (1944, 1982), Roberts, T.J. (1991), Smythies (1981, 1986), Sody (1989), Stepanyan (1990a, 1995), Storrs (1944), Tomek (1985), Vaurie (1965), Yan Anhou (1985).

15. Common Cuckoo

Cuculus canorus

French: Coucou gris

German: Kuckuck

Spanish: Cuco Común

Other common names: (Grey/European/Eurasian) Cuckoo

Taxonomy. *Cuculus canorus* Linnaeus, 1758, Sweden.

Forms a superspecies with *C. gularis*, with which formerly considered conspecific. Populations of C Asia (Russian Altai and E Sinkiang through Mongolia to N & C China) sometimes separated subspecifically as *telephonus* on the basis of size (smaller than *subtelephonus*) and pale plumage (like *subtelephonus*), but birds in this area are not constant in these characters and overlap with other races occurs; range limits of nominate and race *subtelephonus* in C Asia rather unclear. Four subspecies currently recognized.

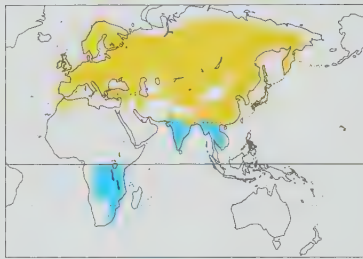
Subspecies and Distribution.

C. c. bangsi Oberholser, 1919 - Iberian Peninsula, Balearic Is, Morocco, Algeria and Tunisia; winters in Africa.

C. c. canorus Linnaeus, 1758 - British Is and Scandinavia E through N Russia and Siberia to Kamchatka and Japan, and S to Pyrenees and Mediterranean, Asia Minor and N Iran, Turkmenia, Kazakhstan, Mongolia, N China and Korea; winters in Africa and S Asia.

C. c. subtelephonus Zarudny, 1914 - C Asia from Turkestan to W Ala Shan in S Mongolia; winters in S Asia and Africa.

C. c. bakeri Hartert, 1912 - W China (W Sichuan) to Himalayan foothills in N India, Nepal, Khasi Hills, Myanmar (including Shan States), NW Thailand and S China; winters to Assam, E Bengal and SE Asia.



Descriptive notes. 32-33 cm; 115 g. Adult male dark ashy-grey above; tail blackish brown, spotted and tipped with white, unevenly barred black; chin to breast ashy-grey, rest of underparts white with black bars; eye-ring yellow, iris light brown to orange, bill black with yellow base, feet yellow. Female similar, but with rufous tinge on upper breast; female (race *canorus* only) also occurs in a rufous ("hepatic") morph, with upperparts barred chestnut and blackish brown, rump and uppertail-coverts plain rufous, underparts white barred pale chestnut and blackish, lower breast tinged rufous. Juvenile has white nape spot, white tips to crown and back

feathers. Race *subtelephonus* pale, black bars below narrow; *bakeri* darker grey than *canorus*; *bangsi* smaller, females often with much rufous on breast. **Voice.** Male song a loud burry "cuck-oo", first note higher and louder; female a bubbling "kwik-kwik-kwik!". Silent on winter grounds in Africa, but occasionally sings when on spring migration in coastal E Africa.

Habitat. Forests and woodlands, both coniferous and deciduous, second growth, open wooded areas, wooded steppe, scrub, heathland, also meadows, reedbeds. Lowlands and moorlands and hill country to 2000 m, in Nepal to 3800 m.

Food and Feeding. Insects, mainly caterpillars, less often dragonflies, damselflies, mayflies, crickets, cicadas; beetles in cold weather upon spring arrival on N breeding grounds; also spiders, snails, rarely fruit. Preys on eggs and nestlings of small birds. Female may forage 2-3 km from laying sites; male feeds at up to 4 km from singing site.

Breeding. Season May-Jun in UK and elsewhere in NW Europe, Apr-May in Algeria, Apr-Jul in India and Myanmar. Brood-parasitic: hosts include many insectivorous songbird species (over 100 have been recorded), e.g. flycatchers, chats, warblers, pipits, wagtails and buntings; some species only occasionally parasitized, but still raise young cuckoo. Often mobbed by real or potential hosts near their nests. Eggs polymorphic in colour (blue, pink, whitish) and pattern (spotted or unmarked) in Palearctic, where 15 distinct types recognized, and c. 77% of eggs closely match those of host in colour and pattern; eggs also polymorphic in E India, where mimic eggs of several host species; 23 x 17 mm; incubation 11-5-12-5 days. Nestling period 17-18 days; evicts host's eggs and chicks; fledges at 80 g, then fed by foster parents for another 2-3 weeks.

Movements. Migratory in N of range, arriving in SW Britain mainly Apr-May, when occasionally recorded in small parties, and even in one flock of 50+ birds; also seasonal in hill country from Assam and Chin Hills to Shan States, where present Mar-Aug. Resident in tropical lowland areas of S Asia. Winter resident in sub-Saharan Africa and in Sri Lanka. W Palearctic populations migrate to Africa, where a Dutch-ringed juvenile found in Togo in Oct and a British-ringed juvenile found in Cameroon in Jan; migrants appear in N Senegal as early as late Jul through Oct; in W Africa nearly all records are in autumn (Sept-Dec), birds apparently continuing on to C & S Africa. Race *bangsi* occurs on passage in W Africa, and winters S of equator from W Africa to L Tanganyika. Asian populations of nominate *canorus* and *bakeri* winter in India, SE Asia and Philippines, also in Africa, but the extent of migration of Asian birds to Africa is unknown; some *subtelephonus* migrate through Middle East and occur in winter from Uganda and E Zaïre to Zimbabwe, Mozambique and Natal. Mainly a passage migrant in Middle East, though some breed in region. Migrants also appear on islands in W Indian Ocean (Seychelles, Aldabra). Nominative *canorus* accidental in Iceland, Faeroes, Azores, Madeira, Canary Is and Cape Verde Is, rarely also Alaska and eastern N America; one record of *canorus* in Indonesia, off W Java in winter.

Status and Conservation. Not globally threatened. Generally a common and vocally conspicuous species throughout its range. Densities include 1-2 males/km² in suitable habitats in N Europe. Population of Britain and Ireland estimated at 16,000-32,000 pairs, and that of France at 100,000-1,000,000 pairs. Numbers have been decreasing in W Europe during 20th century.

Bibliography. Ali & Ripley (1981), Alvarez (1994, 1996), Ash & Miskell (1983), Baker (1906-1907, 1907, 1908, 1934), Becking (1981), Bent (1940), Berthold *et al.* (1995), Blaise (1965), Braa *et al.* (1992), Brazil (1991), de Blichambaut (1993), Brooke & Davies (1987, 1988, 1989, 1991), Chance (1922, 1940), Chapin (1939), Christie (1979), Craib (1994), Cramp (1985), Davies & Brooke (1988, 1989a, 1989b), Davies, Bourke & Brooke (1989), Davies, Brooke & Kacelnik (1996), Dementiev & Gladkov (1951a), Desfayes (1974), Dowsett & Dowsett-Lemaire (1993), Dowsett & Forbes-Watson (1993), Dröschner (1990), Duckworth (1991), Ernst (1992a), Étchécopar & Hùe (1964, 1978), Evans, M.I. (1994), Fiebig (1993), Flint *et al.* (1984), Fry *et al.* (1988), Gärner (1981, 1982), Gibbs *et al.* (1996), Glue & Murray (1984), Grimes (1987), von Haartman (1976, 1981), Higuchi (1986, 1989), Higuchi & Sato (1984), Hùe & Étchécopar (1970), Hund & Prinzinger (1980), Järvinen (1984), Johansen (1955), Jones *et al.* (1997), Kennerley & Leader (1991), Khayutin *et al.* (1982), Kipp (1976), Knystautas (1993), Labitte (1954, 1958), Lack

(1963), Livesey (1938a, 1938b), Löhrl (1950, 1979), Lotem (1993), Lotem *et al.* (1992, 1995), Louette & Herroelen (1993), Lowe (1943), Maclean (1993), Makatsch (1937), Malchevsky (1960, 1987), Matsuda & Uchida (1990), Mees (1979), Moksnes & Røskft (1987, 1992, 1995), Moksnes, Røskft, Bi ik *et al.* (1993), Moksnes, Røskft & Braa (1991), Moksnes, Røskft, Braa *et al.* (1991), Moksnes, Røskft & Korsnes (1993), Moksnes, Røskft & Solli (1994), Moksnes, Røskft & Tysse (1995), Molnár (1944), Moreau (1972), Morel & Chappuis (1992), Nakamura (1990), Nakamura & Miyazawa (1990), Øien, Moksnes & Røskft (1995), Øien, Monza *et al.* (1996), Parkes (1990b), Payne (1968, 1977a, 1977b), Perrins (1967), Pinto (1983), Reichhoff (1983), Rey (1892), Riddiford (1986), Roberts, T.J. (1991), Rogacheva (1992), Schulze-Hagen (1992), Seel (1973, 1977a, 1977b, 1984a, 1984b), Seel *et al.* (1981), Shirihai (1996), Smith & Hosking (1955), Smythies (1986), Southern (1954), Verheyen (1950, 1951), Voipio (1953), Werth (1947), Wyllie (1975, 1981), Yamagishi & Fujioka (1986), Yoshino (1988), Zimmerman *et al.* (1996).

16. African Cuckoo

Cuculus gularis

French: Coucou africain

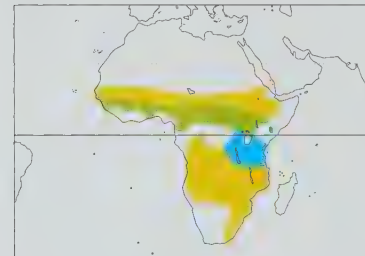
German: Afrikanerkuckuck

Spanish: Cuco Barbablanca

Taxonomy. *Cuculus gularis* Stephens, 1815, Camdeboo, Cape Province.

Forms a superspecies with *C. canorus*, with which formerly considered conspecific. Monotypic.

Distribution. Senegal and Gambia through N Nigeria to Eritrea, NW Somalia and Kenya, and S to Namibia, Botswana, Zimbabwe and E South Africa (Transvaal and Natal).



Descriptive notes. 32 cm; 110 g. Adult dark ashy-grey above; tail dark grey with blackish barring, white tip, outer feathers barred white; chin to breast ashy-grey, rest of underparts white with narrow black bars which tend to fade out on lower belly; eye-ring yellow, iris yellow, bill yellow with black tip. Female sometimes slightly barred or rufous on throat or breast; no rufous morph. Juvenile greyer (not brown) than *C. canorus*, broader white spots in tail. **Voice.** Male song a loud burry "coo-coo", second note slightly higher and louder; female a bubbling "kwik-kwik-kwik!".

Habitat. Open woodland, acacia savanna;

avoids dense evergreen forest and arid regions.

Food and Feeding. Insects, mainly caterpillars. Forages through foliage, and also takes food on ground.

Breeding. Breeds in rains, Jan-Jun in coastal Ghana, Feb-Apr in Nigeria, Aug-Nov in Kenya, Sept-Dec in S Africa. Brood-parasitic: hosts in Senegal, Ghana, Togo and Nigeria include Fork-tailed Drongo (*Dicrurus adsimilis*) and Yellow-billed Shrike (*Corvinella corvina*), perhaps occasionally other species. Eggs whitish with pale brown spots or rufous blotches, similar to drongo eggs; 25 x 18 mm. Nestling evicts host's eggs and young; fledges in 20-23 days.

Movements. Intra-African migrant. Arrives with the rains, sings and breeds during rainy season, then disappears; no ringing recoveries to show details of seasonal dispersal. In Malawi, arrives Oct and departs by Apr; in Kenya, appears with the rains, present mainly Oct-May, but breeds by Aug; in Ghana and Togo, observed Jan-Aug or Sept, rarely Oct and Nov; in Nigeria and Gambia, observed in all seasons, though not throughout this period in any one locality.

Status and Conservation. Not globally threatened. Fairly common in general throughout its sizeable range, though no precise figures available; locally common in some parts, notably in S Africa, but rather uncommon in E Africa.

Bibliography. Bannerman (1953), Benson & Benson (1977), Benson *et al.* (1971), Britton (1980a), Cheke & Walsh (1996), Dowsett & Dowsett-Lemaire (1993), Dowsett & Forbes-Watson (1993), Elgood, Fry & Dowsett (1973), Elgood, Heigham *et al.* (1994), Evans & Balmford (1992), Friedmann (1956, 1967), Fry *et al.* (1988), Ginn *et al.* (1989), Gore (1990), Grimes (1979, 1987), Jackson & Sclater (1938), Jensen & Jensen (1969), Lamarche (1980), Lewis & Pomeroy (1989), Mackworth-Præd & Grant (1957, 1962, 1970), Maclean (1993), Morel & Chappuis (1992), Nikolaus (1987), Ottow & Duve (1965), Payne (1977a, 1986), Penry (1994), Pinto (1983), Rowan (1983), Short *et al.* (1990), Snow (1978), Tarboton (1975, 1986), Wachter *et al.* (1997), Zimmerman *et al.* (1996).

17. Himalayan Cuckoo

Cuculus saturatus

French: Coucou oriental

German: Hopfkuckuck

Spanish: Cuco Oriental

Other common names: Oriental Cuckoo (with *C. horsfieldi*); Blyth's Cuckoo, Southern Muted Cuckoo

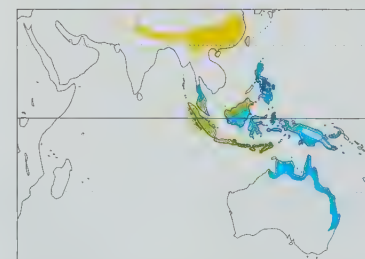
Taxonomy. *Cuculus saturatus* Blyth, 1843, Nepal.

Often regarded as conspecific with *C. horsfieldi*, but the songs of the two are distinct (see page 512). Bornean population formerly recognized as a distinct subspecies, *insulindeae*, but does not differ from *lepidus* of Malaysia, Sumatra and Java. Race *lepidus*, including Bornean birds, has been included in *C. poliocephalus*, but on present evidence more appropriately placed in present species. Two subspecies currently recognized.

Subspecies and Distribution.

C. s. saturatus Blyth, 1843 - Kashmir through S Himalayas, Assam, N & E Myanmar (including Shan States) and Thailand to S China and Taiwan; winters from Malaysia and Philippines S to Lesser Sundaes, New Guinea and Australia.

C. s. lepidus S. Müller, 1845 - Peninsular Malaysia, Sumatra (and satellite islands), Borneo, Java, Bali and Lesser Sundaes (Lombok, Sumbawa, Flores, Pantar, Sumba, Timor).



Descriptive notes. 29 cm; 90-6 g. Adult male dark ashy-grey above, tail blackish brown, spotted and tipped with white; chin to breast ashy-grey, lower breast and abdomen white with black bars, vent white to creamy apricot with barring somewhat variable; eye-ring yellow, iris yellow to brown, bill black with yellow base, feet yellow. Female similar, with rufous tinge to breast; also occurs in a rufous morph, in which rump and uppertail-coverts rufous with dark barring (like *C. horsfieldi*, but unlike *C. canorus* and *C. poliocephalus*). Juvenile slate-grey above with white feather edges, throat black with white bars, below

barred black and white, iris brown; two plumage morphs in both sexes. Differs from very similar *C. canorus* in black bars below usually being broader and more widely spaced, and bend of wing

below unbarred (barred brown and white in *C. canorus*); also, rufous morphs have rump and uppertail-coverts barred dark (plain rufous in *C. canorus*). Race *lepidus* significantly smaller. Voice. Song a high note followed by 3 lower flat notes, "hoop, hoop-hoop" or "tun-tadun"; female call "quick-quick-quick". Silent in non-breeding range.

Habitat. Forest canopy, open wooded areas and orchards, often in hill country, also in coniferous forest and in birch (*Betula*) above tree-line. Occurs at all altitudes in Java and Sumatra; a montane species in Borneo, mostly at 1300-2700 m, and in Himalayas at 1500-3300 m.

Food and Feeding. Insects, mainly caterpillars (hairless and hairy: Arctiidae, Lasiocampidae, Sphingidae, Saturniidae, Noctuidae), grasshoppers, crickets, beetles, also ants; some fruit.

Breeding. Breeds during nesting season of small warblers: May-June in Kashmir, May in Fujian, Feb-Jul in Malay Peninsula, Jul in Java and Borneo. Brood-parasitic: hosts mainly small warblers of genera *Phylloscopus* and *Seicercus*, e.g. Large Crowned Warbler (*P. occipitalis*) in Kashmir, Crowned Leaf-warbler (*P. reguloides*) in Himalayas and Assam, Mountain Leaf-warbler (*P. trivirgatus*) in Borneo, Chestnut-crowned Warbler (*S. castaneiceps*) in Malaysia, Sunda Warbler (*S. grammiceps*) in Java. Eggs variable, oviduct eggs pale blue or white with fine black and brown or reddish stippling; 21 x 16 mm.

Movements. Race *lepidus* is resident. Nominate *saturatus* is a summer visitor to its breeding areas, being present for example in Kashmir from late Apr to Aug and in Nepal in Mar-Sept; it winters in the Malay Peninsula and Philippines and S through Sumatra, Java, Borneo, Sulawesi, Moluccas, Lesser Sunda and New Guinea, to the coastal parts of N & E Australia.

Status and Conservation. Not globally threatened. Numbers depend on maintaining forest habitats for populations of the host species. Present species is common in mountains in Borneo, where both resident *lepidus* and non-breeding *saturatus* are said to be present in equal numbers; *lepidus* is uncommon in Sumatra and Java, but common at hill stations in Peninsular Malaysia. Few data are available on nominate *saturatus*, which appears to be only a scarce winter visitor to the lowlands of Malaysia; status in Thailand uncertain, but species is uncommon and may well be mainly a passage migrant.

Bibliography. Abdulali (1977), Ali & Ripley (1981), Ali *et al.* (1996), Baker (1906-1907), Bates & Lowther (1952), Becking (1975, 1981), Bent (1940), Cheng Tsohsin (1987), Coates (1985), Coates & Bishop (1997), Cramp (1985), Deignan (1945), Dementiev & Gladkov (1951a), Dickinson *et al.* (1991), Échécopar & Hùe (1978), Hellebrekers & Hoogerwerf (1967), Junge (1937a, 1956), Kennerley & Leader (1991), Lekagul & Round (1991), MacKinnon & Phillips (1993), Majumdar *et al.* (1992), van Marle & Voous (1988), Medway & Wells (1976), Price & Jandar (1990), Rand & Gilliard (1967), Ripley (1944, 1982), Roberts, T.J. (1991), Smythies (1981, 1986), Sody (1989), Vaurie (1965), Wells (1972a, 1982), Wells & Becking (1975), White & Bruce (1986).

18. Horsfield's Cuckoo

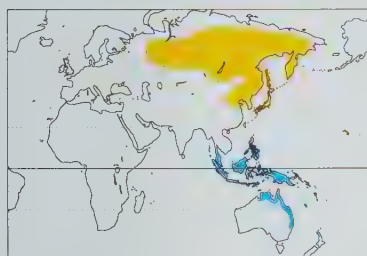
Cuculus horsfieldi

French: Coucou asiatique **German:** Horsfeldkuckuck **Spanish:** Cuco de Horsfield
Other common names: Oriental Cuckoo (with *C. saturatus*); Northern Muted Cuckoo

Taxonomy. *Cuculus horsfieldi* F. Moore, 1857, Java.

Often regarded as a subspecies of *C. saturatus*, but the songs of the two are distinct (see page 512). Monotypic.

Distribution. European Russia E through Siberia to Kamchatka, S to Kazakhstan, the Altai, Mongolia and N China, Korea and Japan. Winters from SE Asia to Australia.



Descriptive notes. 30-33 cm; 99 g. Adults virtually identical to *C. saturatus*, but larger: eye-rings yellow, iris yellow to brown, bill black, greenish to yellow at base and cutting edge, feet yellow. Differs from *C. canorus* in having bend of wing below unbarred white, and often wider and sparser black bars below (especially in C Asia, where race *subtelephonus* of *C. canorus* has narrow bars); rufous morph female has rump and uppertail-coverts barred dark (plain rufous in *C. canorus*). Juvenile, as in *C. saturatus*, often more broadly barred black below than juvenile *C. c. canorus*, but some are dark grey on throat and upper breast, with lower breast and

belly almost unbarred white. Voice. Song 4 low "hoop" whistles, the first one soft; also a harsh call, "gaak-gaak-gak-ak-ak".

Habitat. Forests, especially coniferous and mixed-coniferous, e.g. with birch (*Betula*) and aspen (*Populus*); sometimes broadleaf forests and thickets, as in Japan. In Sichuan to 4500 m; in Altai at lower altitudes than *C. canorus*, rarely above 1000 m.

Food and Feeding. Insects, mainly hairy caterpillars, also beetles, hymenoptera, flies.

Breeding. Brood-parasitic: hosts include Chiffchaff (*Phylloscopus collybita*) and other *Phylloscopus* warblers, e.g. Large Crowned Warbler (*P. occipitalis*), and also Olive-backed Pipit (*Anthus hodgsoni*) in Russia; Bush Warbler (*Cettia diphone*) in N Japan; *P. occipitalis* and other small songbirds elsewhere in Japan. Eggs brown in N Japan, whitish with brown markings elsewhere in Japan; 22 x 15.7 mm. Nestling naked at hatching, orange gape, black gape flanges; evicts host's eggs and young.

Movements. Migratory. Winters in Malaysia, Sumatra, Java, Borneo, Philippines, Moluccas, S to New Guinea and N & E Australia; straggler to New Zealand, Bering Sea islands and W Alaska, also W Europe.

Status and Conservation. Not globally threatened. Species is common or frequent in its W Palearctic range and in NE Asia. Owing to difficulties of identification, the relative abundance of *C. saturatus* and present species in their non-breeding ranges, in Indonesia, New Guinea and Australia, remains essentially unknown.

Bibliography. Ali & Ripley (1981), Becking (1975), Brazil (1991), Cheng Tsohsin (1987), Coates (1985), Cramp (1985), Dementiev & Gladkov (1951a), Dickinson *et al.* (1991), Ernst (1992a, 1992b), Échécopar & Hùe (1978), Fiebig (1993), Flint *et al.* (1984), Gore & Pyong-Oh (1971), Grant (1964), Higuchi (1986, 1989), Higuchi & Payne (1986), Knyshtaus (1993), MacKinnon & Phillips (1993), van Marle & Voous (1988), Mauersberger (1980), Parkes (1990b), Rand & Gilliard (1967), Reed (1972), Ripley (1982), Rogacheva (1992), Smythies (1981), Stepanyan (1990a), Tomek (1985), Vaurie (1965), Wells (1972a), White & Bruce (1986).

19. Asian Lesser Cuckoo

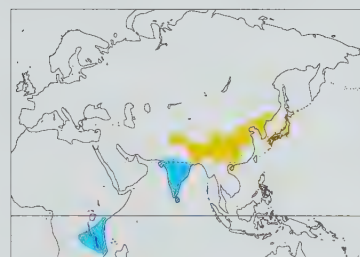
Cuculus poliocephalus

French: Petit Coucou **German:** Gackelkuckuck **Spanish:** Cuco Chico
Other common names: Lesser/Small/Little Cuckoo

Taxonomy. *Cuculus poliocephalus* Latham, 1790, India.

Forms a superspecies with *C. rochii*, the two sometimes being treated as conspecific. Race *C. saturatus lepidus* has been placed in present species, but present evidence does not support that treatment. Monotypic.

Distribution. N Afghanistan, N Pakistan and Kashmir E through Himalayan foothills to Khasi and Naga Hills, Bangladesh and N Myanmar, and across China to Ussuriland, Korea and Japan; winters in peninsular India, Sri Lanka and E Africa.



Descriptive notes. 25 cm; 52 g. Adult male slate-grey above, tail and uppertail-coverts contrastingly blackish, tail with white tip and white spots at sides; bend of wing below unbarred white; throat and breast light grey, belly white with black bars, undertail-coverts often also barred black; eye-ring yellow, iris dark brown, bill black with yellow base, feet tan-yellow. Female similar, sometimes with breast washed rufous; also occurs in rufous morph, with head and upperparts rufous, back and wings barred rufous and black, rump and uppertail-coverts plain rufous. Juvenile slate-grey with white bars above, face black with white bars, breast and belly barred black

and white; rufous morph barred tawny above, barred brown and buff below. Voice. Loud, husky chattering song, "eat your choko pepper", 6 notes at 1.5-2.5 kHz, rising and falling in pitch.

Habitat. Forests, both broadleaf and pine, scrub, second growth; in Ussuri Territory in broadleaf forests of birches (*Betula*), hornbeams (*Carpinus*), maples (*Acer*) and oaks (*Quercus*). Mostly between 1500 m and 3660 m in Himalayas; in Japan usually to 1200 m, sometimes to 2300 m. In non-breeding season in India, this is only cuckoo noted in pine forest plantations, similar to its habitat in breeding area in India.

Food and Feeding. Insects, mainly caterpillars (geometrids, noctuids), also beetles, hymenoptera, mantids.

Breeding. Breeds May-Jul. Brood-parasitic: hosts small warblers, wren-babblers (*Pnoepyga*) and shortwings (*Brachypteryx*) in India, Japanese Bush-warbler (*Cettia diphone*) and other small songbirds in Korea and Japan. Eggs in Japan unmarked brown. 21 x 16 mm; in India, similar unmarked brown eggs from oviduct of laying females resemble cuckoo eggs found in nests of *Niltava* flycatchers; other eggs from laying females in India are unmarked white, resembling cuckoo eggs from nests of Large Crowned Warbler (*Phylloscopus occipitalis*).

Movements. Migratory, entire breeding population apparently moving SW or S to wintering grounds. Winters in peninsular India, Sri Lanka and also in E Africa; occurs in Seychelles on autumn (Nov) and spring (Apr) passage. Almost unknown in Thailand, where only three specimens known (all from N in May). Present in Kenya Nov-April: one ringed in coastal Kenya in Nov recovered inland in Kenya in Dec; birds in Apr clearly departing migrants, as they are fat and silent.

Status and Conservation. Not globally threatened. Few data on abundance; common to fairly common locally in Nepal. Populations depend on maintaining habitat and numbers of its host species. Not uncommon in winter in E Africa, but considered rare in winter in Sri Lanka.

Bibliography. Ali & Ripley (1981), Ali *et al.* (1996), Bates & Lowther (1952), Becking (1981, 1988), Benson (1951), Benson & Benson (1977), Benson *et al.* (1971), Brazil (1991), Britton (1980a), Cheng Tsohsin (1987), Dementiev & Gladkov (1951a), Dowsett & Dowsett-Lemaire (1993), Dowsett & Forbes-Watson (1993), Échécopar & Hùe (1978), Fiebig (1993), Flint *et al.* (1984), Friedmann (1956), Fry *et al.* (1988), Fujimaki (1992), Gore & Pyong-Oh (1971), Higuchi (1986, 1989), Higuchi & Payne (1986), Higuchi & Sato (1984), Knyshtaus (1993), Legge (1880), Lewis & Pomeroy (1989), Mackworth-Præd & Grant (1957, 1962), Maclean (1993), Madoc (1976), Moreau (1972), Nechaev (1972), Osmaston (1916), Phillips (1978), Ripley (1982), Roberts, T.J. (1991), Short *et al.* (1990), Smythies (1986), Stepanyan (1990a, 1995), Wells (1972a), Wells & Becking (1975), Zimmerman *et al.* (1996).

20. Madagascar Lesser Cuckoo

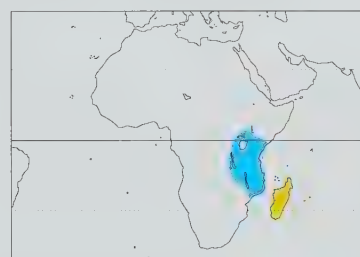
Cuculus rochii

French: Coucou de Madagascar **German:** Madagaskarkuckuck **Spanish:** Cuco Malgache
Other common names: Madagascar Cuckoo

Taxonomy. *Cuculus rochii* Hartlaub, 1863, Tamatave, Madagascar.

Forms a superspecies with *C. poliocephalus*, of which sometimes considered a race. Monotypic.

Distribution. Madagascar. Migrates to E Africa.



Descriptive notes. 26 cm; 64 g. Adult, sexes alike, rufous morph unknown; slate-grey above, tail and uppertail-coverts black, tail with white tip and white spots at sides; bend of wing below grey-barred white; throat and breast light grey, belly white with black bars, undertail-coverts usually unbarred; eye-ring yellow, bill black with yellow base, broader at base than in *C. poliocephalus*, feet yellow. Female as male, no rufous morph. Juvenile resembles juvenile *C. poliocephalus*, some with rufous spots or bars in wing. Voice. Four evenly spaced notes, "ho-ho-ho-hu", first three higher and fourth lower, the whole song lower in pitch than that of *C.*

poliocephalus.

Habitat. Forest, including introduced eucalyptus plantations, gallery forest, scrub woodland spiny subdesert woodland and marshes; recorded in various altered habitats. Sea-level to 1800 m.

Food and Feeding. Insects, e.g. hairy caterpillars.

Breeding. Breeding season Oct-Apr (egg records). Brood-parasitic: hosts Madagascar Cisticola (*Cisticola cherina*); 10 of c. 210 clutches were parasitized, also Common Jery (*Neomixis tenella*); 1 of c. 50 clutches, Madagascar Paradise Flycatcher (*Terpsiphone mutata*); 1 of 8 clutches and Madagascar Sunbird (*Nectarinia souimanga*). Eggs whitish, often tinged pink, spotted with reddish brown, do not closely match eggs of host species; c. 18 x 14 mm.

Movements. Migratory. Most of the population moves in non-breeding season from Madagascar NW to Africa, where occurs in Apr-Sept from E Zaire and Kenya to Zambia, Malawi and Mozambique. Arrives and sings in Madagascar in Sept-Nov, somewhat later in the dry SW. Within Madagascar, migrates in rainy season from forested E to dry W of country. Occasional in Mauritius.

Status and Conservation. Not globally threatened. No precise data on abundance from breeding range in Madagascar, but commonly heard in wide range of habitats, from E rain forest to spiny subdesert woodland, and probably common to very common. Species appears to be at best uncommon in African non-breeding quarters, but is little known and quite possibly overlooked.

Bibliography. Albiguac (1970), Appert (1996), Becking (1988), Benson (1974), Benson & Benson (1977), Benson, Brooke *et al.* (1971), Benson, Colebrook-Robjent & Williams (1976-1977), Berlioz (1948), Britton (1980a), Dee (1986), Delacour (1930, 1932a), Dowsett & Dowsett-Lemaire (1980, 1993), Dowsett & Forbes-Watson (1993), Fry *et al.* (1988), Langrand (1990), Lewis & Pomeroy (1989), Louette & Herroelen (1993), Mackworth-Præd & Grant (1957, 1962), Maclean (1993), Milon (1959), Milon *et al.* (1973), Rand (1936), Salvan (1970), Short *et al.* (1990), van Someren (1947), Wilmé (1994), Wilmé *et al.* (1997), Zimmerman *et al.* (1996).

21. Pallid Cuckoo

Cuculus pallidus

French: Coucou pâle

German: Blaßkuckuck

Spanish: Cuco Pálido

Taxonomy. *Columba pallida* Latham, 1801, New South Wales.

Considered by some authorities to be intermediate in form between genera *Cuculus* and *Cacomantis*. Monotypic.

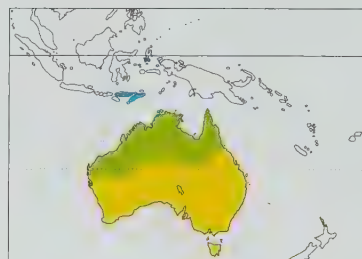
Distribution. Australia and Tasmania. Winters N to Wallacea.

Descriptive notes. 31-32 cm; 82 g. Adult grey above, broad pale supercilium, darker grey line through eye, pale nape patch, outer tail barred white; pale grey below, not barred; eye-ring yellow, iris dark brown, bill black, feet grey. Some birds (subadults?) are mottled brown and rufous above, with breast barred black and rufous. Juvenile white with black streaks above, throat and breast blackish, lower breast and belly white with dark grey streaks. **VOICE.** Male's song an 8-note whistle on ascending scale (second note lower); female a hoarse whistle.

Habitat. Open forests, woodlands, scrub, spinifex plains, mangroves, gardens; most numerous in drier country. Found in the most interior parts of Australia more commonly than any other cuckoo.

Food and Feeding. Insects, mainly grasshoppers, beetles, caterpillars and other larvae. Food taken in trees or on the ground.

Breeding. Breeds Mar-Jun and Sept in N, Aug-Oct in SW Western Australia, Sept-Dec in E Australia. Adult male courtship-feeds female. Brood-parasitic: hosts mainly honeyeaters (Meliphagidae) with open nests, also shrike-thrushes (*Colluricincla*), cuckoo-shrikes (*Coracina*) and others: 21 of 32 known hosts are honeyeaters. Eggs pink, unspotted or with brown specks around large end; 25 x 16 mm;



incubation 12-14 days. Young evicts host's eggs and chicks; fed by hosts as long as 6 weeks after fledging, and sometimes fed by neighbouring birds as well as by hosts themselves. Adult of present species once seen feeding a fledged young attended by its hosts.

Movements. Resident, migratory, or with erratic movements in most of Australia, where many birds overwinter. In N Australia occurs in all months, but little breeding; in drier parts of Australia mainly a wet-season visitor. In SW Western Australia, adults arrive Jun and depart Nov; juveniles may remain with foster parents until Feb. Migratory movements are seen along

coastal E Australia, in the Murray-Darling region, and at Murphy's Creek. Non-breeding birds occur during the austral winter in the Moluccas and Lesser Sundas (Flores, Timor), and occasionally in New Guinea. Movements and the distribution of wintering birds through Australia N of 20°S, the reporting rates in summer and winter N of South Australia, and the limited range of cuckoos elsewhere suggest that most birds remain in Australia and move within the continent. In Tasmania, occurs only in the breeding season.

Status and Conservation. Not globally threatened. Widespread and common, at least locally, though some variation in numbers. This species seems reasonably adaptable, since it occurs in residential and suburban areas where honeyeater hosts are attracted to flowering gardens, as well as in less inhabited areas of scrub and open woodland.

Bibliography. Beruldsen (1980), Blakers *et al.* (1984), Brooker & Brooker (1989a), Coates (1985), Coates & Bishop (1997), Cooper (1958), Disney (1977), Hall (1974), Hardy & Hardy (1973), Hobbs (1990), Kikkawa & Dwyer (1962), Klapste (1981), Lindsey, T.R. (1992), Macdonald (1988), Marchant (1989), Mayr (1964), Noske (1981), Pizzey & Doyle (1980), Rand & Gilliard (1967), Rose (1997a), Schodde & Tidemann (1986), Simpson & Day (1996), Smith (1989), Storr (1977, 1980, 1984b, 1991), Strahan (1994), Stresemann, E. & Stresemann (1966), Stresemann, V. & Stresemann (1961), Stronoch (1981), Trounson & Trounson (1987), Watts (1993), White & Bruce (1986), Woodell *et al.* (1985).



Genus *CERCOCOCCYX* Cabanis, 1882

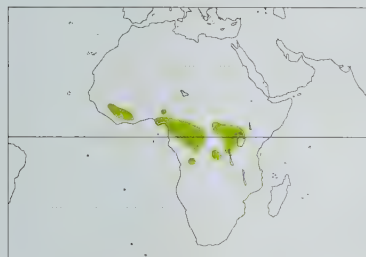
22. Dusky Long-tailed Cuckoo

Cercococcyx mehowi

French: Coucou de Mechow **German:** Schweifkuckuck **Spanish:** Cuco Colilargo Oscuro

Taxonomy. *Cercococcyx mehowi* Cabanis, 1882, Angola. Monotypic.

Distribution. Sierra Leone, Guinea, Liberia and Ivory Coast through Nigeria, Cameroon, Gabon and Congo to E Zaire, Uganda and NW Tanzania, and S to C Zaire and extreme NW Angola.



Descriptive notes. 31-34 cm; 55 g. Adult dark grey above, flight-feathers barred rufous, tail long, rectrices broad, tipped white or pale rufous; wing about 75% of tail length; black barring below, belly unmarked reddish buff; iris brown, eyelids yellow, bill greenish black, lower mandible greenish, mouth yellow, legs and feet yellow. Juvenile has rufous edges to crown, neck and breast feathers, variably rufous-barred upperparts, rectrices pointed. **Voice.** (1) Whistle of 3 emphatic notes, "tu-tu-to", on same or slightly rising pitch, accent on second note, the series repeated after 1-sec pause; rate of 17 songs/40 sec. (2) Whistle of c. 30 syllables and 10-sec

duration, "teu, tew, du du du...", slightly falling in pitch, slowing near end. Silent in non-breeding season.

Habitat. Lowland mature forest, especially lower levels and dense undergrowth, often near water-courses.

Food and Feeding. Insects, especially caterpillars, most hairy; also beetles, ants, spiders, small snails and seeds.

Breeding. Breeds during rains; calls Apr-Dec near Kagoro, Nigeria; gonads enlarged Dec-Feb in Cameroon; apparent laying Nov and Jan in NE Gabon. Brood-parasitic: hosts not well known, but fledgling fed by Brown Illadopsis (*Trichastoma fulvescens*); also, adult perched on nest of Blue-headed Monarch-flycatcher (*Trochocercus nitens*) as it apparently laid. Forest robin (*Stiphrornis erythrothorax*) suspected as host, with two observations of unspotted, brownish cuckoo eggs in nest; hatchling cuckoo ejected young robin, and partly developed plumage of juvenile *C. mehowi*.

Movements. Resident. Extent of seasonal wandering unknown.

Status and Conservation. Not globally threatened. In general, not reckoned to be rare, though apparently uncommon in Nigeria; not uncommon in Sierra Leone. This is an elusive species, difficult to see, so size of population is difficult to gauge.

Bibliography. Ash (1990), Baker & Baker (1994), Bannerman (1953), Benson (1964), Britton (1980a), Brosset & Énard (1986), Chapin (1928, 1939), Cheke & Walsh (1996), Christy & Clarke (1994), Colston & Curry-Lindahl (1986), Dowsett & Forbes-Watson (1993), Dyer *et al.* (1986), Elgood *et al.* (1994), Friedmann (1966), Fry *et al.* (1988), Grimes (1987), Lippens & Wille (1976), Louette (1981), Louette & Herroelen (1994), Mackworth-Praed & Grant (1957, 1962, 1970), Pinto (1983), Ripley & Heinrich (1966a), Short *et al.* (1990), Snow (1978).

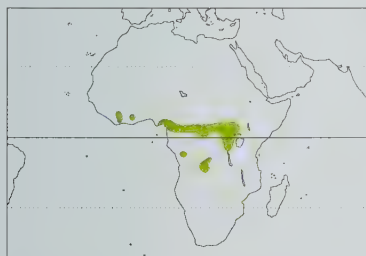
23. Olive Long-tailed Cuckoo

Cercococcyx olivinus

French: Coucou olivâtre **German:** Olivkuckuck **Spanish:** Cuco Colilargo Oliváceo

Taxonomy. *Cercococcyx olivinus*, Sassi, 1912, forest on mountains bordering Rutshuru Plain, Zaire. Forms a superspecies with *C. montanus*. Monotypic.

Distribution. Guinea and Ghana through S Nigeria and Cameroon to N Congo, N Zaire, W Uganda, Kasai zone (NE Angola, SW Zaire), NW Angola and NW Zambia; possibly also Sierra Leone, with two recent records from Gola Forest.



Descriptive notes. 32-34 cm; 65 g. Adult dark olive-brown above, crown greyish, remiges and coverts often unbarred, tail long, rectrices broad, tipped white or pale rufous; wing about 82% of tail length; whitish below, with black barring; iris dark brown, eye-ring and skin around eye greenish yellow, bill slate, lower mandible greenish with slate tip, mouth yellow, feet yellow. Juvenile tawny with rufous feather tips above, throat pale, streaked below, rectrices pointed. **Voice.** (1) Song a persistent, emphatic 3-note call, falling in pitch, repeated at rate of 10 songs/25 sec. (2) Call a loud melodious "do-you?", the first note higher and louder, the second sliding

down from the first, sometimes leading into a rising bubbling series.

Habitat. Forest, mainly unbroken mature forest, also small patches of forest, secondary growth, and gallery forest.

Food and Feeding. Insects, mainly hairy caterpillars. Forages in middle and upper strata of forest and in crowns of trees; accompanies mixed-species flocks of foraging birds.

Breeding. Breeding season apparently in rains in many regions, but between main rains (little dry season) in wetter regions; gonads enlarged Sept-Nov in Angola, oviduct egg Sept in Uelle (Zaire); possible host nests in Dec - Feb in NE Gabon. Brood-parasitic: hosts unknown, possibly Pale-breasted Illadopsis (*Trichastoma rufipennis*) based on identification of cuckoo egg in nest; possibly Finsch's Flycatcher-thrush (*Neocossyphus finschii*) based on uttering of call resembling that of this songbird. Egg deep blue with brown-violet spots, unlike that of other cuckoo species in same area (the egg disappeared); oviduct egg white, unspotted, 23 x 16-4 mm.

Movements. Resident. No known movements.

Status and Conservation. Not globally threatened. Population levels unknown, but species said to be uncommon in Nigeria. Like *C. mehowi*, however, this is a shy and secretive species, noticed only when calling in tops of tall forest trees.

Bibliography. Bannerman (1953), Benson (1964), Britton (1980a), Brosset & Énard (1986), Chapin (1928, 1939), Christy & Clarke (1994), Colston & Curry-Lindahl (1986), Dowsett & Forbes-Watson (1993), Dowsett-Lemaire *et al.* (1993), Elgood *et al.* (1994), Fry *et al.* (1988), Gee & Heigham (1977), Grimes (1987), Lippens & Wille (1976), Louette (1981), Louette & Herroelen (1994), Mackworth-Praed & Grant (1957, 1962, 1970), Pinto (1983), Ripley & Heinrich (1966a), Short *et al.* (1990), Snow (1978).

24. Barred Long-tailed Cuckoo

Cercococcyx montanus

French: Coucou montagnard **German:** Bergkuckuck **Spanish:** Cuco Colilargo Montano
Other common names: Barred Cuckoo

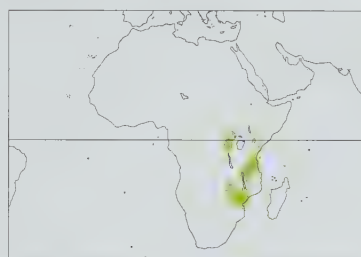
Taxonomy. *Cercococcyx montanus*, Chapin, 1928, Kalongi (c. 2100 m), Butahu Valley, Ruwenzori Range, Zaire.

Forms a superspecies with *C. olivinus*. Two subspecies recognized.

Subspecies and Distribution.

C. m. montanus Chapin, 1928 - montane forests of EC Africa from Ruwenzori to L Tanganyika.

C. m. patulus Friedmann, 1928 - Kenya to S Zaire, Zambia, E & S Tanzania, Malawi, E Zimbabwe and Mozambique.



Descriptive notes. 32-34 cm; 54 g. Adult dull olive-brown above, feathers with rufous edges, tail long, rectrices broad, tipped white or pale rufous; white below, barred blackish, often with pale buff wash; skin around eye yellow, iris brown, bill black, greenish at base, feet yellow. Juvenile (*patulus*) with cinnamon-rufous edges to dorsal feathers, streaked below, upper breast and throat blackish with scaly mottling, rectrices pointed. Races differ in size and colour tone: *montanus* smaller, dark above with greenish sheen; *patulus* larger, paler. **Voice.** Song long, 40 sec, starting like whistled "do-you" of *C. olivinus* or *Cuculus solitarius*, leading to 3-syll

lable whistles with first and third notes accented, "pi-pi-ti", sometimes with "pi-pi" syllables at end; series is repeated, becoming more and more rapid and emphatic. Sings mainly during hours before sunrise, and during day if the weather is foggy and humid. Calls from canopy of tall trees, often at night.

Habitat. Forest, montane in most areas, in E Africa also riparian and lowland, coastal thickets and forest-savanna mosaic. To 2800 m.

Food and Feeding. Insects, mainly hairy caterpillars, taken in foliage of trees; occasionally small snails.

Breeding. Few egg dates, apparently breeds in rainy season; in Malawi, calls Dec-Apr, in E Tanzania Sept-Dec. Brood-parasitic: suspected hosts Sharpe's Akalat (*Sheppardia sharpei*) and other akalats, also African Broadbill (*Smithornis capensis*). Egg (laid in captivity) white with few reddish spots, similar to *Sheppardia* egg, another oviduct egg white like *Smithornis* egg; 21 x 15 mm.

Movements. Resident, with some altitudinal and middle-distance movements, including nocturnal movements.

Status and Conservation. Not globally threatened. Although this species seems to be uncommon, it is, like its congeners, secretive and generally overlooked, except when singing. Locally common in forest between 1700 and 2100 m on E slopes of Mt Kenya and on S slopes of the Aberdares: common between 900 and 1600 m in Usambara Mts.

Bibliography. Benson (1964), Benson & Benson (1977), Britton (1977, 1980a), Britton & Zimmerman (1979), Chapin (1928), Clancey (1985, 1996), Dean *et al.* (1974), Dowsett (1990), Dowsett & Forbes-Watson (1993), Evans *et al.* (1994), Fry *et al.* (1988), Ginn *et al.* (1989), Lewis & Pomeroy (1989), Lippens & Wille (1976), Louette & Herroelen (1994), Mackworth-Praed & Grant (1957, 1962, 1970), Maclean (1993), Ripley & Heinrich (1966b), Rowan (1983), Short *et al.* (1990), Stjernstedt (1984), Taylor & Taylor (1988), Snow (1978), Zimmerman *et al.* (1996).

Genus *CACOMANTIS* S. Müller, 1843

25. Banded Bay Cuckoo

Cacomantis sonneratii

French: Coucou de Sonnerat **German:** Sonneratkuckuck **Spanish:** Cuco Bayo
Other common names: Indian Banded Bay/Banded/Bay-banded Cuckoo

Taxonomy. *Cuculus Sonneratii* Latham, 1790, North Cachar Hills, India.

Sometimes placed in monotypic genus *Penthoceryx*; alternatively included in *Cuculus* by some authors. Five subspecies recognized.

Subspecies and Distribution.

C. s. waiti (Stuart Baker, 1919) - Sri Lanka.

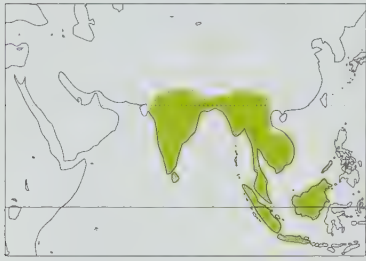
C. s. sonneratii (Latham, 1790) - India and Nepal through Bangladesh and Myanmar to SW China, Thailand and Indochina.

C. s. malayanus (Chasen & Kloss, 1931) - Peninsular Malaysia.

C. s. schlegeli (Junge, 1948) - Sumatra, Borneo and Palawan (SW Philippines).

C. s. musicus (Ljungh, 1804) - Java.

Descriptive notes. 22 cm; 37 g. Adult bright rufous or bay above, barred with brown, whitish supercilium, white line under eye, tail rufous with subterminal black band and narrow white tip; whit-



note "smoke-yer-pepper", faster and more plaintive than in *Cuculus micropterus*; also a rising call of 3-4 slow whistled notes, then 3-6 faster notes, rising in pitch to sudden stop.

Habitat. Open or dense broadleaf forest, deciduous and evergreen, forest edge, secondary scrub, cultivated lands. Lowlands to 900 m, more rarely to 1500 m, in Himalayas occasionally to 2400 m.

Food and Feeding. Insects, especially caterpillars (Pieridae, Notodontidae, Arctidae), but also bugs and grasshoppers.

Breeding. Breeding season in India varies with that of its hosts, Feb-Aug; in Sri Lanka young in Jun and Oct; in Malaysia sings Jan-May. Brood-parasitic: hosts include Common Iora (*Aegintha tiphia*) in India and Java, Scarlet Minivet (*Pericrocotus flammeus*) in Sri Lanka. Eggs mimic those of *Aegintha*, white with sparse reddish brown marks; 18 x 14 mm. Nestling evicts host's eggs and chicks.

Movements. Resident in SE Asia, e.g. in Borneo, Thailand and Malay Peninsula, but partially migratory in India, where widely scattered in monsoons. In Nepal possibly a summer visitor only, Feb-Oct. Unknown whether those in Philippines are local breeders or non-breeding visitors.

Status and Conservation. Not globally threatened. Common or fairly common in much of its range, for example in Sri Lanka, Myanmar, Peninsular Malaysia and Greater Sundas, but uncommon in Nepal and Thailand.

Bibliography. Abdulali (1943), Ali & Ripley (1981), Baker (1906-1907), van Balen (1991), Becking (1981), Deignan (1945), Delacour & Jabouille (1931), Dickinson *et al.* (1991), Harrison (1969b), Harvey (1990), Hellebrekers & Hoogerwerf (1967), Junge (1948), Lekagul & Round (1991), MacKinnon & Phillips (1993), Madoc (1976), Majumdar *et al.* (1992), van Marle & Voous (1988), Medway & Wells (1976), Phillips (1948, 1978), Price (1979), Ripley (1982), Smythies (1981, 1986), Sody (1989), Stepanyan (1995).

26. Plaintive Cuckoo

Cacomantis merulinus

French: Coucou plaintif

German: Klagekuckuck

Spanish: Cuco Plañidero

Other common names: Brain-fever bird; Indian Plaintive Cuckoo, Grey-bellied Cuckoo (*passerinus*); Rufous-bellied Plaintive Cuckoo, Grey-breasted Brush Cuckoo (*merulinus*)

Taxonomy. *Cuculus merulinus* Scopoli, 1786, Panay, Philippines.

Included in *Cuculus* by some authors. Grey-bellied form *passerinus* sometimes recognized as a distinct species on basis of reported sympatry in NE India, but songs of *passerinus* and *merulinus* are the same, their juvenile plumages are similar, and the host species of *passerinus* appear to be the same as for races *querulus* and *merulinus*, indicating a similar ecological role too. Situation unclear in E Nepal, where race *querulus* was reported twice in 1980's, during Feb. Five subspecies currently recognized.

Subspecies and Distribution.

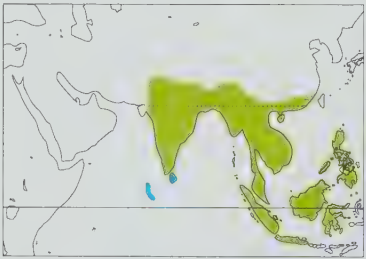
C. m. passerinus (Vahl, 1797) - Himalayas of N Pakistan and N India E to Nepal, Sikkim, Bhutan and possibly Assam, and S through peninsular India to Nilgiris and Wynad (Kerala); winters S to Sri Lanka and Maldiv Is.

C. m. querulus Heine, 1863 - Assam and Lower Bengal E to S China (including Hainan), and S through Myanmar, Thailand, Laos and Vietnam to N Peninsular Malaysia; some migrate S to peninsular India and SE Asia.

C. m. threnodes Cabanis & Heine, 1863 - S Peninsular Malaysia, Sumatra and Borneo.

C. m. lanceolatus (S. Müller, 1843) - Java and Sulawesi.

C. m. merulinus (Scopoli, 1786) - Philippines.



Descriptive notes. 18-23.5 cm; 22-25 g. Adult of race *passerinus*: dark grey above, lightly glossed green, tail blackish with white tip; chin to breast dark grey, belly and undertail-coverts whitish or grey; rare type all sooty-blackish with brownish tail tip; eye-ring blackish, iris red to brown, some with yellowish outer circle, bill blackish above, yellow below, feet yellow. Female also occurs in rufous morph, bright rufous above, barred with black, plain rufous tail, throat and breast, rest of underparts dark-barred whitish. Juvenile variable, some all dark grey, finely barred whitish on belly, others rufous with crown light rusty-brown and streaked darker brown.

back and wings barred rusty and dark brown (rusty bars wider than dark brown bars), tail black with white bars and with or without rufous edge, underparts black-barred whitish. Races differ mainly in plumage: *querulus* brown above, throat and breast grey (often washed rufous), belly rufous; *threnodes* barely paler buff-rufous below than *querulus*; *merulinus* pale buff below, breast often washed grey; *lanceolatus* often paler brown above, greyish white below merging into pale rufous-buff belly and vent. VOICE. Rising song a 3-note phrase, "tay-ta-tee", repeated on rising scale; cadence song an accelerating trill on descending scale, "tee-tee-tee-tee-tita-tita-tita-tee", 4 slow notes followed by 4 rapid notes. In India, a plaintive clear whistle, "ka-veer". Call "piter" or "tchree", attributed to female. No geographic variation in song is known, when considered for each call type.

Habitat. Open woodland, secondary forest, scrub, brush, gardens and cultivated areas, including in towns and villages, also grassy plains and swamps. Lowlands to c. 2000 m; in Nepal mostly to 1400 m, rarely to 2135 m.

Food and Feeding. Insects, mainly hairy caterpillars (Saturniidae) but also hairless ones (Notodontidae), beetles, bugs, termite soldiers, other soft-bodied insects; also fruit. Appears in foliage canopy, where an active and restless forager.

Breeding. Breeds May-Jun in Kalimantan, Jun-Sept in India, Apr-Aug in N Thailand. Brood-parasitic: hosts mainly warbler species with closed nests with narrow entrance, e.g. Ashy Prinia (*Prinia socialis*), Common Tailorbird (*Orthotomus sutorius*) and Zitting Cisticola (*Cisticola juncidis*) in In-

dia, Yellow-bellied Prinia (*Prinia flaviventris*), Olive-backed Taylorbird (*Orthotomus sepium*) and *C. juncidis* in Java. Eggs dull, light buff to green with light olive marks; 18 x 12 mm. Evicts host's eggs.

Movements. Resident and seasonally migratory. In Nepal a breeding visitor, mainly late Apr to Aug; in Yunnan (SW China), present Feb-Oct. In Sri Lanka, *passerinus* arrives with the dry NE monsoon in Oct and leaves in Apr, does not sing, no breeding records. Many specimens from Java differ from local resident race *lanceolatus*, but match N race *querulus*, indicating immigration from N during latter's non-breeding season.

Status and Conservation. Not globally threatened. Common throughout most of range, for instance in India, Myanmar, Malaysia and Greater Sundas; very common in Thailand; fairly common in Philippines. In Nepal, however, said to be rather scarce, though probably overlooked; nearly all observations there are of *passerinus*, and definitive sightings of *querulus* are extremely rare. In Sri Lanka, common in winter in dry zones and in gardens, rare in the wet zone, casual straggler in the hills.

Bibliography. Abdulali (1971), Ali & Ripley (1981), Ali & Whistler (1937), Ali *et al.* (1996), Baker (1906-1907), Becking (1981), Bharucha (1982), Biswas (1951a, 1960), Cheng Tsohsin (1987), Coates & Bishop (1997), Deignan (1945), Dickinson *et al.* (1991), Échécopar & Hüe (1978), Harrison (1969b), Hartert (1925c), Harvey (1990), Hellebrekers & Hoogerwerf (1967), Legge (1880), Lekagul & Round (1991), Livesey (1939), MacKinnon & Phillips (1993), Madoc (1976), Majumdar *et al.* (1992), van Marle & Voous (1988), Medway & Wells (1976), Oates & Blanford (1895), Osmaston (1916), Parkes (1960b), Phillips (1948, 1978), Rabor (1977), Ripley (1982), Roberts (1991), Smythies (1960, 1981, 1986), Sody (1989), Stanford (1931), Stepanyan (1995), Stresemann (1912, 1940), Wait (1925), Watling (1983), Whistler (1944, 1949), White & Bruce (1986), Zacharias & Gaston (1993).

27. Brush Cuckoo

Cacomantis variolosus

French: Coucou des buissons

German: Buschkuckuck

Spanish: Cuco Varioloso

Other common names: Square-tailed/Grey-headed Cuckoo; Rufous-breasted Brush Cuckoo (*lepidus*); Indonesian/Rusty-breasted (Brush) Cuckoo (*sepulcralis*)

Taxonomy. *Cuculus variolosus* Vigors and Horsfield, 1827, Paramatta, New South Wales.

Sometimes placed in *Cuculus*. Form *sepulcralis* (incorporating *everetti*, *virescens*, *aeruginosus*, *infaustus*) is often treated as a distinct species on grounds of claimed morphological and vocal differences; sometimes reckoned to be closer to *C. merulinus*. Several additional island races have been described, but are nowadays considered invalid. Eleven subspecies recognized.

Subspecies and Distribution.

C. v. sepulcralis (S. Müller, 1843) - S Thailand and Peninsular Malaysia through Sumatra, Borneo, Java, Bali and Philippines to Lesser Sundas (Lombok, Sumbawa, Flores, Sumba).

C. v. everetti Hartert, 1925 - SW Philippines (Basilan and Sulu Is.).

C. v. virescens (Brüggemann, 1876) - Sulawesi.

C. v. aeruginosus Salvadori, 1878 - W & C Moluccas (Sula, Buru, Ambon, Seram).

C. v. infaustus Cabanis & Heine, 1863 - N & E Moluccas (Morotai, Tidore, Ternate, Halmahera, Bacan, Obi, Seram Laut, Watubela, Kai), New Guinea and islands to NE.

C. v. oreophilus Hartert, 1925 - highlands of E & S New Guinea.

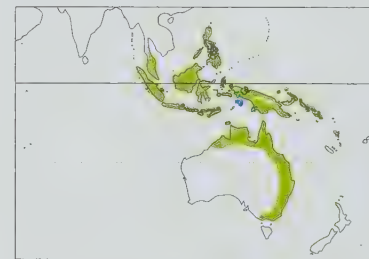
C. v. blandus Rothschild & Hartert, 1914 - Admiralty Is.

C. v. macrocerus Stresemann, 1921 - Bismarck Archipelago (except New Hanover), Tabar I.

C. v. websteri Hartert, 1898 - New Hanover.

C. v. addendus Rothschild & Hartert, 1901 - Solomon Is.

C. v. variolosus (Vigors & Horsfield, 1827) - N & E Australia; winters N to Aru Is, Kai Is, Moluccas, New Guinea, W Papuan islands and Lesser Sundas (Timor, Kisar).



Descriptive notes. 21-28 cm; 34 g. Adult male *sepulcralis* grey above, head grey, wings brown, tail black with white tip and white notches on outer edges; rufous below, unbarred, chin pale grey, undertail broadly barred brown with thin whitish notching on inner webs; eye-ring yellow, iris brown (inner rufous, outer ring whitish), bill black with yellow below, feet yellow. Female finely barred grey below. Juvenile has head, back and wings barred buff and dark brown (brown bars wider than buff bars; darker than juvenile *C. merulinus*), tail dark brown, barred rufous and (rarely) white, black-barred white below, iris whitish grey or pale light

brown. Races differ mainly in plumage coloration: *everetti* darker below, chin rufous, wing shorter; *virescens* greenish brown above, tail with white only at tip, darker below, throat and breast grey (*aeruginosus* similar but slightly darker); *variolosus* brownish grey above, head light grey, pale grey below, breast and belly buff, eye-ring more often grey, iris dark brown, bill black; *infaustus* darker above, breast and upper belly rufous-grey, eye-ring yellow or grey, feet olive or brownish; *oreophilus* averages shorter-winged, larger-billed than *infaustus*, eye-ring dark; *blandus* grey on throat and upper breast (may be washed rufous), rufous belly; *macrocerus* belly grey, rufous or intermediate, tail as *virescens* but longer, eye-ring grey or yellow; *websteri* grey below, tail shorter; *addendus* large, green-glossed blackish above, throat grey, breast and belly dark rufous to rufous-buff, eye-ring yellow. VOICE. Song a series of c. 7-8 mournful whistled notes, each descending, "fear-fear-fear...", series starting high and becoming lower in pitch (or on same pitch); also a shrill rising 3-note phrase, "where's the tea", and a single "referee-whistle". On Bougainville, song a series of notes, rising or falling, and more trilled at end.

Habitat. Rainforest, secondary forest, scrub, mangroves, waterside thickets of honeymyrtle (*Melaleuca*), plantations, village groves, in undergrowth. Lowlands to c. 600 m in Thailand, to 1200 m in Peninsular Malaysia, Greater Sundas and Solomon Is., to 1300 m in New Guinea, mainly 1500-2500 m in Sulawesi, sea-level to 2000 m in Philippines.

Food and Feeding. Insects, mainly caterpillars (hairless and hairy: Pieridae, Lasiocampidae, Saturniidae, Arctidae; also Lepidoptera eggs), also grasshoppers, beetles, bugs, wasps; spiders, snails. Takes prey from leaves and branches within the foliage of trees and bushes.

Breeding. Breeds in rains in Australia, where Sept-Jan in N Queensland, Dec-Mar in Kimberley region. Brood-parasitic, with more than 60 species of host recorded, including: Chestnut-naped Forktail (*Enicurus ruficapillus*) in Borneo; Olive-backed Sunbird (*Nectarinia jugularis*) in Sulawesi; tailorbirds (*Orthotomus*) in Sumatra; Long-tailed Shrike (*Lanius schach*), flycatchers (*Culicicapa*, *Cyornis*, *Ficedula hyperythra*), fantails (*Rhipidura*) and Pied Stonechat (*Saxicola caprata*) in Java; *S. caprata* on Flores; Buru Yellow White-eye (*Zosterops buruensis*) on Buru; White-shouldered Wren (*Malurus alboscapulatus*), Yellow-tinted Honeyeater (*Lichenostomus flavescens*), Lemon-breasted Flycatcher (*Microeca flavigaster*) and others in New Guinea; *Rhipidura*, flycatchers (*Myiagra*), small honeyeaters (*Ramsayornis*, *Melithreptus*), Purple-crowned Fairy-wren (*Malurus coronatus*) and robins (*Petroica*), both open- and closed-nest hosts, in Australia; and Chestnut-bellied Monarch (*Monarcha*

castaneiventris) in Solomon Is. Eggs (Australia) variable: whitish with brownish spots around large end, or whitish with few tiny spots of black, each type corresponding to a host species; 19 x 14 mm; incubation less than 13 days. Hatchling (*variolosus*) naked, skin black; evicts host's eggs and young; fledges in 17-19 days, fed for a month after leaving nest.

Movements. Resident in lowlands of Malaysia and Thailand, and in much of range elsewhere. S Australian birds migrate N after breeding, while those in tropical regions of Australia are partially migratory to resident; non-breeding visitors from these regions occur N to Timor, the Moluccas and New Guinea.

Status and Conservation. Not globally threatened. Common in the Philippines; widespread in lowland forest in Sabah; abundant in lower and middle tiers of open forest in New Britain. Although it seems to be uncommon in NW of range, in Thailand, it becomes more numerous farther S, in Malaysia and the Greater Sundas; in Sulawesi, not uncommon at Dumoga-Bone National Park. In Australia this cuckoo is sometimes common, but its numbers fluctuate somewhat.

Bibliography. Amadon (1942), Beehler *et al.* (1986), Beruldsen (1978, 1980), Blakers *et al.* (1984), Brooker & Brooker (1989a), Cain & Galbraith (1956), Coates (1985), Coates & Bishop (1997), Cranbrook & Wells (1981), Diamond (1975a), Diamond & LeCroy (1979), Dickinson, Kennedy & Parkes (1991), Dickinson, Kennedy, Read & Rozendaal (1989), Gilliard (1950b), Gilliard & LeCroy (1967a), Goodman *et al.* (1995), Hall (1974), Hartert (1925c, 1930), Hellebrekers & Hoogerwerf (1967), Lekagul & Round (1991), MacKinnon & Phillipps (1993), Madoc (1976), van Marie & Voous (1988), Mayr (1944b), Mayr & Meyer de Schauensee (1939b), Mayr & Rand (1937), Medway & Wells (1976), Ottow & Verheijen (1969), Parkes (1960b, 1973), Rand & Gilliard (1967), Rozendaal & Dekker (1989), Sibley (1951), Siebers (1930), Smythies (1981), Sody (1989), Storr (1980, 1984b), Strahan (1994), Stresemann (1912, 1914), Watling (1983), White & Bruce (1986).

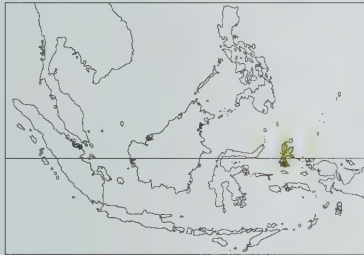
28. Moluccan Cuckoo

Cacomantis heinrichi

French: Coucou de Heinrich **German:** Molukkenkuckuck **Spanish:** Cuco Moluqueño
Other common names: Heinrich's Cuckoo, Heinrich's/Moluccan Brush Cuckoo

Taxonomy *Cacomantis heinrichi* Stresemann, 1931, Sibela, 1500 m, Bacan.
Sometimes placed in *Cuculus*. Formerly considered a colour morph of *C. variolosus*, but is smaller and shorter-winged than sympatric form of latter. Monotypic.

Distribution. Bacan and Halmahera (N Moluccas).



Descriptive notes. 23 cm. Adult dark olive-brown above; throat dark grey, breast and belly dark rufous, undertail-coverts dark reddish; eye-ring greyish, iris dark brown with lighter outer ring, feet yellow. Juvenile dark above, barred below. Adult differs from sympatric *C. variolosus infaustus* in brighter yellow feet; also smaller in both wing length and overall size. **Voice.** Unknown.

Habitat. Forest, at 1000-1500 m.

Food and Feeding. Unknown; presumably mainly insects.

Breeding. No information available.

Movements. No movements known.

Status and Conservation. Not globally threatened. Data Deficient. Known only from five specimens, all collected in 1931; species has apparently not been seen since then. Because of its restricted range, it may be at risk, but data are insufficient to determine its conservation status. Research needed in order to establish basic biological and ecological requirements, as well as current population levels.

Bibliography. Andrew (1992), Anon. (1995b), Coates & Bishop (1997), Collar *et al.* (1994), Hartert (1925c), Inskipp *et al.* (1996), Jepson (1997), Stresemann (1931), Sujatnika *et al.* (1995), Wheatley (1996), White & Bruce (1986).

29. Chestnut-breasted Cuckoo

Cacomantis castaneiventris

French: Coucou à poitrine rousse **German:** Rostbauchkuckuck **Spanish:** Cuco Ventricastaño

Taxonomy. *Cuculus* (*Cacomantis*) *castaneiventris* Gould, 1867, Cape York district, Queensland, Australia.

Sometimes placed in *Cuculus*. Three subspecies recognized.

Subspecies and Distribution.

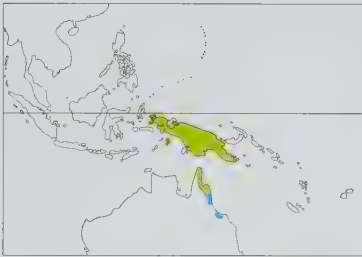
C. c. arfakianus Salvadori, 1889 - W Papuan islands and W New Guinea from Vogelkop to Weyland and Snow Mts and E to R. Fly.

C. c. weiskei Reichenow, 1900 - E New Guinea, from Sepik region, Huon Peninsula and upper R Purari eastwards.

C. c. castaneiventris (Gould, 1867) - Aru Is and NE Australia (E coast of Cape York and NE Queensland).

Descriptive notes. 24 cm; 34 g. Adult slate-grey above, bright chestnut below; eye-ring yellow, iris brown, bill black and yellow, feet yellow. Juvenile unbarred dark grey-brown above, tail with rufous outer edge, unbarred brown to buff below. Race *arfakianus* dark chestnut below, smaller; *weiskei* green-glossed blackish above, darker chestnut below, size as *arfakianus*. **Voice.** Loud 3-note mournful whistled "seei-to-seei", first note upslurred, second shorter, third upslurred and trilled; also a descending trill, and a single whistling "chir-rip".

Habitat. Interior of montane forest, rain forest and scrub along riverbanks; also in mangroves, but rare at sea-level, mainly occurring at 1200-2100 m.



Food and Feeding. Insects, especially caterpillars. Moves through forest canopy, taking insects; also watches from low perch, and flies to ground; also hovers.

Breeding. Breeds ?Sept/Oct-Dec/Jan in Australia. Brood-parasitic; hosts include Grey-green Scrubwren (*Sericornis arfakianus*) in New Guinea, Tropical Scrub-wren (*S. beccarii*) in Australia. Egg white, freckled reddish; estimated c. 19 x 14 mm.

Movements. In most of range resident, and fairly sedentary, including observations around the year in Cape York, Australia; in extreme S probably occurs only as a non-breeding visitor.

Status and Conservation. Not globally threatened. Overall status unclear, as very few data available on relative abundance throughout range; species appears to be scarce to rare in Cape York Peninsula.

Bibliography. Beehler *et al.* (1986), Beruldsen (1980), Blakers *et al.* (1984), Brooker & Brooker (1989a), Coates (1985), Gilliard & LeCroy (1961), Gregory (1995a, 1995b), Hall (1974), Hartert (1925c), Lindsey, T.R. (1992), Macdonald (1988), Mayr & Rand (1937), McWhirter (1986b), Pizzey & Doyle (1980), Rand & Gilliard (1967), Schodde & Tidemann (1986), Simpson & Day (1996), Storr (1984b), Strahan (1994), Trounson & Trounson (1987).

30. Fan-tailed Cuckoo

Cacomantis flabelliformis

French: Coucou à éventail **German:** Fächerschwanzkuckuck **Spanish:** Cuco Flabelforme
Other common names: Fan-tailed Brush Cuckoo, Ash-coloured Cuckoo

Taxonomy. *Cuculus flabelliformis* Latham, 1801, Sydney area, New South Wales.
Sometimes placed in *Cuculus*. Species formerly listed as *C. pyrrophanus* (or erroneously as *C. pyrrophanus*), due to confusion as to which form had been the original model for the painting used as the basis of the name *flabelliformis*. Five subspecies recognized.

Subspecies and Distribution.

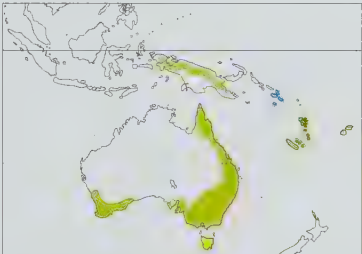
C. f. excitus Rothschild & Hartert, 1907 - mountains of New Guinea.

C. f. flabelliformis (Latham, 1801) - E Australia from Cape York to SE Australia and Tasmania; also SW Western Australia.

C. f. pyrrophanus (Vieillot, 1817) - New Caledonia and Loyalty Is.

C. f. schistaceigularis Sharpe, 1900 - Vanuatu.

C. f. simus (Peale, 1848) - Fiji.



Descriptive notes. 26 cm; 44 g. Adult slate-grey above, tail wedge-shaped, notched white on outer webs; throat grey, breast buff to rufous, undertail with whitish bars ("notching" on edge); eye-ring yellow, iris brown, bill black, feet olive-yellow. Juvenile dark brown above with dull rufous streaks, mottled whitish and black below and indistinctly barred grey and brown. Race *excitus* much darker, greyish black above, grey chin and throat, dusky chestnut below; *pyrrophanus* rich chestnut below, eye-ring grey-brown; *schistaceigularis* grey on throat and upper breast, dark chestnut below; *simus* smaller, slightly paler

chestnut below (also melanistic morph "*infuscatus*", with white confined to tail tip). **Voice.** Descending trill, "peeeeee", also a rising whistle, "p-weet"; female gives loud "chiree".

Habitat. Mainly tall open forests, rainforest, also open woodlands, roadsides, mangroves, heath. In New Guinea, occurs in mountains at 1500-3000 m.

Food and Feeding. Insects, mainly caterpillars, also centipedes, spiders. Forages in foliage, also hawks flying moths and ants.

Breeding. Breeds Aug-Dec in Australia, Nov-Feb in Fiji. Male courtship-feeds female. Brood-parasitic; hosts mainly domed-nest species, include Large-billed Scrubwren (*Sericornis nouhuysi*) in New Guinea; Scarlet Robin (*Petroica multicolor*) in Vanuatu; fairy-wrens (*Malurus*), thornbills (*Acanthiza*) and scrubwrens (*Sericornis*) in Australia (where 17 host species known); and Fiji Warbler (*Vitta ruficapilla*) in Fiji. Egg white, freckled brown and purple; 21 x 15 mm. Hatchling naked, pinkish, in a few days becoming dark brown, gape yellow; evicts host's eggs and young; fledges in 16-17 days.

Movements. Resident in tropics, elsewhere partially migratory or nomadic. Tasmanian breeders move N to Australia. Australian distribution is seasonal in some areas, indicating N and inland post-breeding movements; in Queensland birds "wintering" N of breeding range are mainly immatures. Vagrant or passage migrant in interior Australia. Race *pyrrophanus* occurs irregularly as migrant to E Solomon Is.

Status and Conservation. Not globally threatened. A common species in much of its range and the most numerous cuckoo in parts of E Australia. Population densities in Australian eucalypt woodland are calculated as 0.02-1.1 birds/ha.

Bibliography. Amadon (1942), Ambrose (1987), Beehler *et al.* (1986), Beruldsen (1980), Blakers *et al.* (1984), Bregulla (1992), Brooker & Brooker (1989a), Christidis & Boles (1994), Clunie (1973, 1984), Coates (1985), Gyldestolpe (1955a), Hall (1974), Hartert (1925c, 1930), Hatton (1989), Holyoak (1979), Jansen (1990), Junge (1953), Marchant & Höhn (1980), Mason (1982), Mayr & Rand (1937), Mees (1982a), Noske (1978), Pratt *et al.* (1987), Rand & Gilliard (1967), Rose (1997), Smedley (1983), Smithers (1977), Storr (1984b, 1991), Strahan (1994), Stresemann (1924b), Vuilleumier & Gochfeld (1976).



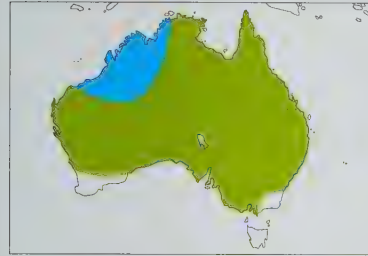
Genus *CHRYSOCOCCYX* Boie, 1826

31. Black-eared Cuckoo

Chrysococcyx osculans

French: Coucou oreillard **German:** Schwarzhörkuckuck **Spanish:** Cuculillo Orejinegro

Taxonomy. *Chalcites osculans* Gould, 1847, New South Wales. Sometimes placed in monospecific genus *Misocalius*. Monotypic.
Distribution. Australia.



Descriptive notes. 20 cm; 30 g. Adult grey above with slight metallic gloss, long white supercilium, broad black band through eye, pale rump, tail grey with white tip; creamy buff below; eye-ring grey, iris black, bill black, feet dark grey. Juvenile similar, but face markings less distinct, underparts buff. Voice. Descending low whistle, "peeceer".

Habitat. Open scrub, dry woodlands, mallee, mulga, saltflats, waterside forests and thickets; rare in subhumid zone.

Food and Feeding. Insects, mainly caterpillars, also beetles; seeds. Forages in shrubs and on ground; flight swift and direct.

Breeding. Breeds Jun-Oct in W, Aug-Dec in E. Brood-parasitic: hosts small Australian warblers, e.g. Redthroat (*Sericornis brunneus*), Little Fieldwren (*S. sagittatus*). Eggs dark brown, resemble those of *S. brunneus*; 20 x 14 mm. Hatchling naked, black skin; evicts host's eggs and young.

Movements. Migratory or nomadic, breeding in response to rains. Breeds mainly S of Tropic of Capricorn. Breeding visitor Sept-Apr in N Queensland, occurs Apr-Jun in S coastal plains in Queensland; wanders to N Australia outside breeding period, when some birds remain in S Australia. Vagrant or rare non-breeding migrant in Aru Is, New Guinea, Moluccas and Lesser Sundas.

Status and Conservation. Not globally threatened. A fairly common species in most of its habitats except wet, forested coastal areas, where it is uncommon; sometimes irregular in occurrence, and at times very scarce. First reported in Tasmania in 1977.

Bibliography. Beehler *et al.* (1986), Beruldsen (1980), Blakers *et al.* (1984), Brooker & Brooker (1989a), Coates (1985), Coates & Bishop (1997), Friedmann (1968), Hall (1974), Hoskin (1989b), Lindsey, T.R. (1992), Macdonald (1988), Pizzey & Doyle (1980), Rand & Gilliard (1967), Schodde & Tidemann (1986), Simpson & Day (1996), Storr (1980, 1984a, 1984b), Strahan (1994), Tronson & Tronson (1987), White & Bruce (1986).

32. Horsfield's Bronze-cuckoo

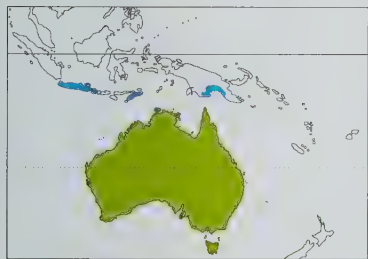
Chrysococcyx basalis

French: Coucou de Horsfield **German:** Rotschwanzkuckuck **Spanish:** Cuculillo de Horsfield
Other common names: Australian/Narrow-billed/Rufous-tailed Bronze-cuckoo, Horsfield's Cuckoo(!)

Taxonomy. *Cuculus basalis* Horsfield, 1821, Java.

Asian and Australasian forms of *Chrysococcyx* sometimes placed in genus *Chalcites*. Monotypic.

Distribution. Australia and Tasmania. Winters N to Java and irregularly beyond.



Descriptive notes. 17 cm; 22 g. Adult brownish bronze above, head browner than back, long white supercilium and dark eye-stripe, tail sides rufous, notched white; whitish below, throat lightly streaked, barred bronze on flanks and sides of breast, undertail barred black and white with rufous centre, underside of flight-feathers with rufous-tinged white band; wing feathers often have crisp pale margins, a feature not noted in congeners; eye-ring grey, iris brown to red, bill slender, black, feet grey. Juvenile similar but duller, plain grey-brown above, feathers sometimes buff-edged, flanks faintly barred, iris grey to light brown. Voice. Descending high whistle,

"peeceer", repeated once every 5 sec, faster and higher than that of *C. osculans*.

Habitat. Open woodland, mulga, scrub, including dry interior, spinifex, coastal saltmarsh, generally arid and semi-arid zones.

Food and Feeding. Insects, mainly caterpillars, also beetles (Coccinellidae), bugs. Forages in foliage and on ground; flight swift and direct.

Breeding. Breeding in Western Australia varies with seasonal rains, Aug-Oct in Southwestern Division, Oct-Dec near Perth, Jan-Mar in Kimberley Division, Mar-May and Aug-Sept in Pilbara region. Brood-parasitic: hosts mainly small thornbills (*Acanthiza*), fairy-wrens (*Malurus*), and Australian robins (*Petroica*) and chats (*Ephthianura*); 28 host species known, mainly with domed nests, some with open nests. Eggs whitish with brown flecks; 18 x 12 mm; incubation 11-13 days. Hatchling naked, skin pink and grey, darkening with age, white gape flanges, yellow mouth-lining; evicts host's eggs and chicks; fledges in 17-19 days, fed up to 4 weeks after fledging.

Movements. Partial migrant. A few remain all year in E Australia E of the Dividing Range and also in S of range, but more are resident in N Australia. Some birds spend non-breeding season N of Australia, and occur on passage on islands off the coast. A non-breeding visitor to S New Guinea and W through Indonesia, where generally uncommon to scarce but probably overlooked, though said to be locally common in NW Java from Mar and Apr; occasional in Sumatra and Sulawesi, one record each in Sumbawa, Flores, Natuna Is, Borneo and Singapore.

Status and Conservation. Not globally threatened. Common in much of breeding range, though scarce in Northern Territory and Kimberley Division of Western Australia. Reported breeding densities of 0.1 bird/ha, or 10 birds/km², are reckoned to be unusually high for this species.

Bibliography. Alley (1978), Andrew (1986), Beehler *et al.* (1986), Beruldsen (1980), Blakers *et al.* (1984), Brooker & Brooker (1986, 1989a, 1989b, 1992), Brooker *et al.* (1988), Coates (1985), Coates & Bishop (1997), Debus (1989), Friedmann (1968), Hall (1974), Heron (1977), Holmes (1996), Hoskin (1989a), Johnstone *et al.* (1993), Lindsey, T.R. (1992), Macdonald (1988), MacKinnon & Philipps (1993), van Marle & Voous (1988), Payne (1997), Payne & Payne (1998), Payne *et al.* (1985, 1988), Pizzey & Doyle (1980), Rand & Gilliard (1967), Rose (1997a), Rowley *et al.* (1991), Schodde & Tidemann (1986), Seale (1976), Serventy & Whittell (1976), Simpson & Day (1996), Sody (1989), Storr (1977, 1980, 1984a, 1984b, 1991), Strahan (1994), Tronson & Tronson (1987), White & Bruce (1986).

33. Little Bronze-cuckoo

Chrysococcyx minutillus

French: Coucou menu **German:** Kleiner Bronzekuckuck **Spanish:** Cuculillo Menudo
Other common names: Malay Green Cuckoo, Malay Bronze-cuckoo; Gould's/Rufous Bronze-cuckoo (*russatus* group); Green-cheeked/Dark-backed Bronze-cuckoo (*rufomerus*); Pied Bronze-cuckoo, Island Cuckoo (*crassirostris*)

Taxonomy. *Chrysococcyx minutillus* Gould, 1859, Port Essington, Northern Territory.

Asian and Australasian forms of *Chrysococcyx* sometimes placed in genus *Chalcites*. Species formerly known as *C. malayanus*, but type of that name was a female of *C. xanthorhynchus*. Present species might be better considered to constitute more than one species, but the songs of all forms, where known, are apparently identical. While the forms listed are generally allopatric, and all use the same type of host species, the occurrence of two forms (*cleis*, *aheneus*) in Borneo suggests possible separate species status: *russatus* group (*aheneus*, *jungei*, *misoriensis*, *poecilurus*, *russatus* and undescribed race from Timor) sometimes treated as a distinct species from *minutillus* group (*peninsularis*, *albifrons*, *cleis*, *minutillus* and *barnardi*) due to apparent sympatry without interbreeding in Borneo, but this may involve migrant birds, and both forms interbreed extensively in N Australia (*russatus* with *barnardi*). Races *rufomerus* and *crassirostris* are also often treated as two separate full species, or as races of one distinct species, on grounds of claimed morphological and ecological differences; race *salvadorii* (known only from type specimen) sometimes considered intermediate between these two, and sometimes included within latter race. Thirteen subspecies currently recognized.

Subspecies and Distribution.

C. m. peninsularis Parker, 1981 - extreme S Thailand and Peninsular Malaysia.

C. m. albifrons (Junge, 1938) - N Sumatra and W Java.

C. m. cleis Parker, 1981 - N & E Borneo.

C. m. aheneus (Junge, 1938) - SE Borneo and S Philippines.

C. m. jungei (Stresemann, 1938) - Sulawesi, Madu and Flores.

C. m. rufomerus Hartert, 1900 - Lesser Sundas (Romang, Kisar, Leti, Moa, Sermata, Damar).

C. m. crassirostris (Salvadori, 1878) - Moluccas (Tayandu, Kai) and Tanimbar Is (Yamdena, Larat).

C. m. salvadorii (Hartert & Stresemann, 1925) - Tepa (Babar Is).

C. m. misoriensis (Salvadori, 1875) - lowlands on N coast of New Guinea, and islands off E, N & NW coasts.

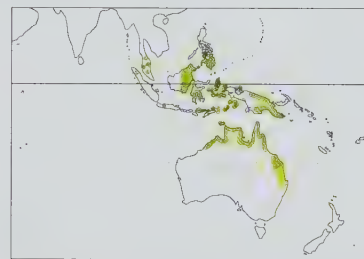
C. m. poecilurus G. R. Gray, 1862 - lowlands on S coast of New Guinea, and islands off W & S coasts including Misool.

C. m. minutillus Gould, 1859 - Moluccas, Lesser Sundas and N Australia, from Kimberley district of NW Australia through Melville I and Arnhem Land to N Queensland (Gulf of Carpentaria to W Cape York).

C. m. russatus Gould, 1868 - N & E Queensland (Cape York along E coast).

C. m. barnardi Mathews, 1912 - E Australia (SE Queensland to NE New South Wales).

Birds from Timor appear to represent a distinct race, as yet undescribed.



Descriptive notes. 15-16 cm; 17 g. Adult male *minutillus* bronze-green above, white forehead, white above eye, bright green crown; tail bronze green (sometimes washed rufous), barred black and white at sides, white tip with black subterminal bar; below white with blackish bars, underwing-coverts barred; eye-ring red, iris red, bill black, feet grey. Female eye-ring tan to yellow or white, iris brown. Juvenile duller, grey-brown above, white to rufous below with trace of barring on flanks, underwing-coverts unbarred or nearly so, eye-ring dull red, iris brown. Races differ widely in plumage: *peninsularis* darker-crowned, face with white frosting, female eye-

ring green; *albifrons* whiter and less barred below; *cleis* slender-billed, more strongly barred below; *barnardi* as *minutillus* but less glossy, wing longer; *russatus* group more rufous (*aheneus* less so), *jungei* with crown and back both frosted brown and slightly glossed, *misoriensis* more rufescent-bronze, *poecilurus* green above lacking rufous or bronze iridescence (but crown glossy dark green), *russatus* bronze-green with tail more rufescent, and rufous below; *rufomerus* dark green above, green cheeks; *salvadorii* has blue-black cheeks and no white above eye, small white wing patch; *crassirostris* green-glossed blackish blue above, white patch on wing. Voice. In *minutillus*, *russatus*, *peninsularis* and Javan *albifrons*, a thin whistled descending "teu teu teu teu" of 4-5 notes with pause after third, also a long descending trill, and two distinct calls: descending "te-te-te-te-te", and tinkling trill. A clear "kiri kiri kiri" is also reported.

Habitat. Lowland forest and forest edge, monsoon forest, honey myrtle (*Melaleuca*) swamp forest, secondary growth, vine thickets, thickets of wattle (*Acacia*) and stringybark (*Eucalyptus tetrodonta*), and mangroves; also frequent in towns and gardens. Generally found in dense lowland vegetation. Occurs from sea-level up to 1400 m; in New Guinea, scarce above 500 m.

Food and Feeding. Insects, mainly caterpillars (Hesperiidae), also beetles (Coccinellidae) and bugs. Forages in tree canopy.

Breeding. In Malaysia eggs in Mar and Aug; breeds Oct-Nov in E Queensland, Sept-Feb in N Queensland, Nov-Mar in Northern Territory. Brood-parasitic: hosts *Gerygone* flycatchers including *G. sulphurea* in Malaysia and Java, *G. magnirostris* in New Guinea and Australia, probably *G. dorsalis* in E Lesser Sundas. Eggs olive-bronze, 21 x 14 mm (Java), olive-brown, 20.5 x 15 mm (New Guinea), bronze with tiny darker spots, 19 x 13 mm (Australia). Hatchling (*minutillus*) pink to black, down on head.

Movements. Partial migrant in Australia, where observed moving across Torres Strait. Race *minutillus* migrates to Lesser Sundas, Moluccas, Sulawesi and New Guinea, but resident throughout year in the Kimberley region and near Darwin, Northern Territory; *barnardi* a partial migrant,

On following pages: 34. Shining Bronze-cuckoo (*Chrysococcyx lucidus*); 35. Rufous-throated Bronze-cuckoo (*Chrysococcyx ruficollis*); 36. White-eared Bronze-cuckoo (*Chrysococcyx meyeri*); 37. Asian Emerald Cuckoo (*Chrysococcyx maculatus*); 38. Violet Cuckoo (*Chrysococcyx xanthorhynchus*); 39. Yellow-throated Cuckoo (*Chrysococcyx flavigularis*); 40. Klaas's Cuckoo (*Chrysococcyx klaas*); 41. African Emerald Cuckoo (*Chrysococcyx cupreus*); 42. Diederik Cuckoo (*Chrysococcyx caprius*).

occurs in austral winter in N Queensland N of its breeding range and in S New Guinea. Other races are resident, but some birds in Thailand may possibly be only non-breeding visitors from farther S. **Status and Conservation.** Not globally threatened. In Australia, appears to be locally common to fairly common, but its occurrence is somewhat erratic. It is uncommon in W of range, and in some parts even scarce. Form *rufomerus*, endemic to six small islands E of Timor, and regarded by some authorities as a full species, has been considered threatened; its status and any possible threats to its population are, however, unknown, and this taxon is now classified as Data Deficient for purposes of conservation requirements. In Sulawesi, commonly heard in forest edge habitat in hilly areas, and also in town streets that are lined with trees; in Jul 1988, at least 16 individuals were heard calling along a stretch of road only 7 km long.

Bibliography. Andrew & Holmes (1990), Beehler *et al.* (1986), Berger (1955), Beruldsen (1980), Blakers *et al.* (1984), Brooker & Brooker (1989a), Christidis & Boles (1994), Coates (1985), Coates & Bishop (1997), Collar & Andrew (1988), Collar *et al.* (1994), Deignan & Amos (1950), Dickinson *et al.* (1991), Ford (1981), Friedmann (1968), Hall (1974), Hellebrekers & Hoogerwerf (1967), Holmes & Burton (1987), Junge (1938a), Lekagul & Round (1991), MacKinnon & Philipps (1993), van Marle & Voous (1988), Mayr & Rand (1937), McGill & Goddard (1979), Medway & Wells (1976), Mees (1982a), Parker (1981), Rand & Gilliard (1967), Smythies (1981), Sody (1989), Storr (1977, 1980, 1984b), Stresemann (1914), Sujatnika *et al.* (1995), Watling (1983), White & Bruce (1986).

34. Shining Bronze-cuckoo

Chrysococcyx lucidus

French: Coucou éclatant **German:** Bronzekuckuck **Spanish:** Cuculillo Broncíneo
Other common names: Golden Bronze-cuckoo, Shining Cuckoo, Golden Cuckoo

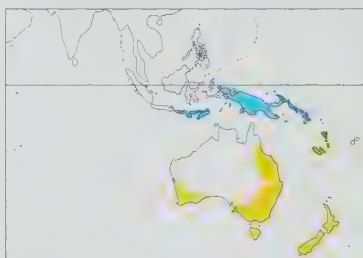
Taxonomy. *Cuculus lucidus* J. F. Gmelin, 1788, Queen Charlotte Sound, New Zealand. Asian and Australasian forms of *Chrysococcyx* sometimes placed in genus *Chalcites*. Within present species, Australian birds are sometimes recognized as a separate race, *plagosus*, with wider bill, more white on side of face, no white on forehead, and more brown or bronze (less green) gloss, but even in Western Australia not all individuals are distinct from birds in New Zealand; both bronze-backed and green-backed birds occur in breeding season in both areas, as do birds with and without white forehead spots. Birds on Malekula I, Vanuatu, described as race *aeneus*, but not morphologically distinct from other populations of the island region. Three subspecies recognized.

Subspecies and Distribution.

C. l. harterti (Mayr, 1932) - Rennell I and Bellona I (S Solomons).

C. l. layardi Mathews, 1912 - New Caledonia and Loyalty Is, Vanuatu, Banks Is and Santa Cruz Is.

C. l. lucidus (J. F. Gmelin, 1788) - Australia, Tasmania and New Zealand; migrates to New Guinea region, N Melanesia and Lesser Sundas.



Descriptive notes. 17 cm; 23 g, but up to 50 g before migration. Adult bronze-green above, tail green, face variably whitish (including lores); white below, barred greenish to bronze, throat white or narrowly barred; eye-ring grey, iris grey to brown, bill black, feet dark grey. Juvenile duller, inconspicuously barred on flanks, iris grey to pale brown. Races *layardi* and *harterti* smaller, former with face dark (dark extends below eye), female *harterti* rufous on throat. **VOICE.** Series of upslurred whistled notes like those used to call a dog, "fee, fee, fee ..."; also a descending "pee-er".

Habitat. Forest, woodland, scrub, mainly areas with more than 380 mm of rainfall; sea-level to 1000 m. In non-breeding range, occurs in secondary growth, forest edge, scrub, savanna, village gardens, *Casuarina* groves, and also forest canopy, occasionally mangroves and pine plantations; from sea-level to 1920 m on New Guinea, and to at least 1000 m on Bougainville.

Food and Feeding. Insects, mainly caterpillars. Forages in tree and shrub canopy, also on ground. Joins mixed-species flocks of insectivorous resident passerines.

Breeding. Breeds Jul to early Dec in Queensland, Oct-Dec in Western Australia. Brood-parasitic: hosts in New Zealand, Grey Warbler (*Gerygone igata*); in Australia, thornbills (*Acanthiza*), fairy-wrens (*Malurus*) and robins (*Petroica*) known, hosts with both domed nests and open nests. Eggs unmarked bronze, in colour and pattern unlike that of any host in Australia (dark egg is hard to see in closed nest); 18 x 12 mm; incubation 13-16 days (longer dates are in New Zealand). Nestling in New Zealand with long white down, gape flange white; in Australia naked or nearly naked at hatching, skin pinkish orange to greenish grey, gape flange (SW Australia) yellow; evicts host's eggs and young; fledges in 18-20 days, cared for by foster parent for up to 5 weeks further.

Movements. Migrant and partial migrant. Nominat *lucidus* breeding in Australia and New Zealand is a long-distance migrant across seas to equatorial non-breeding grounds, mainly in New Guinea and the Solomon Is, where silent; observed on passage across Torres Strait. Occurs in Queensland at all seasons, moving N in autumn and S in spring. A few remain in SE Australia and Tasmania in austral winter. Island races *layardi* and *harterti* are resident.

Status and Conservation. Not globally threatened. Locally common in areas of wooded country in New Zealand and Australia. Breeding densities in Australian eucalypt woodland calculated at c. 1 bird/km². In Vanuatu, apparently more widespread and numerous in past.

Bibliography. Beehler *et al.* (1986), Berger (1955), Beruldsen (1980), Blackburn (1962, 1963), Blakers *et al.* (1984), Bradley & Wolff (1956), Bregulla (1992), Brooker & Brooker (1986, 1989a, 1989b, 1992), Brooker *et al.* (1988), Chambers (1989), Coates (1985), Coates & Bishop (1997), Diamond (1975a), Edgar (1961), Fell (1947), Fitzgerald (1960), Friedmann (1968), Gill (1978, 1980a, 1982a, 1982b, 1983a, 1983b, 1989), Hall (1974), Kendrick (1994), MacDonald & Gill (1991), Marchant (1972), Mayr (1932), McClelland & Moore (1991), McLean & Rhodes (1991), Noske (1994), Payne (1997), Payne & Payne (1998), Rand & Gilliard (1967), Rose (1997a), Rutgers & Norris (1972), Schodde *et al.* (1983), Skinner (1986), St. Paul (1976), Storr (1984a, 1984b, 1991), Wakefin (1967), White & Bruce (1986).

35. Rufous-throated Bronze-cuckoo

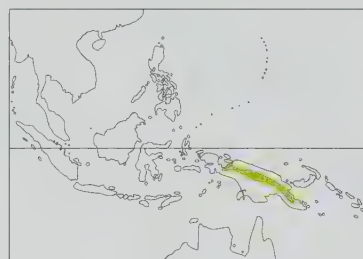
Chrysococcyx ruficollis

French: Coucou à gorge rousse **German:** Rothals-Bronzekuckuck **Spanish:** Cuculillo Gorgirrojo
Other common names: Reddish-throated Bronze-cuckoo, Mountain Bronze-cuckoo

Taxonomy. *Lamprococcyx ruficollis* Salvadori, 1875, Hatam, Arfak Mountains, New Guinea.

Asian and Australasian forms of *Chrysococcyx* sometimes placed in genus *Chalcites*. Monotypic.

Distribution. New Guinea.



Descriptive notes. 16 cm; 23.5 g (laying female). Adult greenish above, with forehead, face, throat and breast rufous, barred white and green below; iris from reddish brown in male to brown in female, bill black, feet olive grey. Juvenile greenish above, grey below, flanks faintly barred grey, iris dark brown. **VOICE.** Song 8-9 identical high-pitched, downslurred whistles, 2/sec, higher-pitched than song of *C. meyeri*.

Habitat. Montane forest and edge in New Guinea highlands; mainly at 1800-2600 m, up to 3350 m.

Food and Feeding. Insects, mainly caterpillars, also flying insects. Joins mixed-species flocks

of foraging birds; sits motionless, staring and peering about for insects under small branches, then moves and seizes the insect.

Breeding. No information available. Presumably brood-parasitic.

Movements. Unknown.

Status and Conservation. Not globally threatened. Few data are available on relative abundance, but species seems to be uncommon to rare within its relatively restricted range. Biology and ecology virtually unknown; research required.

Bibliography. Andrew (1992), Anon. (1994b), Beehler (1978b), Beehler *et al.* (1986), Coates (1985), Coles (1995), Diamond (1972a), Friedmann (1968), Hartert (1930), Jepson (1997), Junge (1953), Mayr & Rand (1937), Parker (1981), Rand & Gilliard (1967).

36. White-eared Bronze-cuckoo

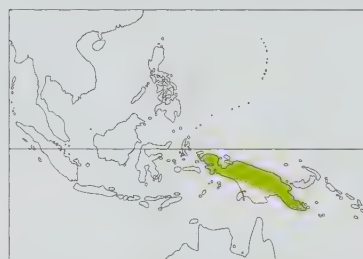
Chrysococcyx meyeri

French: Coucou de Meyer **German:** Rotschwingen-Bronzekuckuck **Spanish:** Cuculillo Orejiblanco
Other common names: Meyer's Bronze-cuckoo, Mountain Bronze-cuckoo

Taxonomy. *Chrysococcyx meyeri* Salvadori, 1874, Hatam, Arfak Mountains, New Guinea.

Asian and Australasian forms of *Chrysococcyx* sometimes placed in genus *Chalcites*. Monotypic.

Distribution. Mountains of New Guinea and Batanta I.



Descriptive notes. 15 cm; 20 g. Adult glossy green above, crown green, ear-coverts white, female with chestnut forecrown; white below with prominent glossy green barring, undertail black with white bars on inner webs of outer feathers; large rufous patch on flight-feathers; eye-ring red in male to grey in female, iris pale brown to grey-brown, darker on inner rim, bill black, feet blue-grey. Juvenile grey-brown above, head grey, tail rufous-grey with dark grey near tip, grey below, iris brown, feet light brown. **VOICE.** Song 5-8 high-pitched clear notes, "peer peer peer...", dropping slightly in pitch, final note preceded by a pause; also a complex song

of 4 pairs of downslurred notes, the pairs rising and falling.

Habitat. Inhabits forests, including forest edge, also garden shade trees, mainly in lower montane habitats at 500-1800 m.

Food and Feeding. Insects, caterpillars in canopy leaves. A regular member in mixed-species foraging flocks.

Breeding. No information available. Presumably brood-parasitic.

Movements. Unknown.

Status and Conservation. Not globally threatened. Virtually nothing known about biology, ecology and population numbers; research required.

Bibliography. Andrew (1992), Austin & Kuroda (1953), Beehler (1978b), Beehler, Burg *et al.* (1994), Beehler, Pratt & Zimmerman (1986), Coates (1985), Diamond (1972a), Eastwood (1995b), Friedmann (1968), Gilliard & LeCroy (1961, 1967b), Gregory (1995a, 1995b), Hartert (1930), Jepson (1997), Junge (1953), Mayr & Rand (1937), Parker (1981), Rand & Gilliard (1967).

37. Asian Emerald Cuckoo

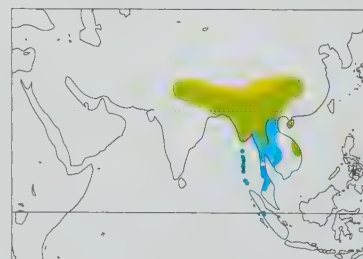
Chrysococcyx maculatus

French: Coucou émeraude **German:** Prachtkuckuck **Spanish:** Cuculillo Esmeralda Asiático
Other common names: Oriental/Asiatic Emerald Cuckoo, Emerald Cuckoo

Taxonomy. *Trogon maculatus* J. F. Gmelin, 1788, Sri Lanka.

Asian and Australasian forms of *Chrysococcyx* sometimes placed in genus *Chalcites*. Monotypic.

Distribution. Himalayas from about Garhwal E through Nepal, Assam, Manipur, Bangladesh, SE Tibet and SC China (Sichuan, Yunnan), S to Myanmar, NW Thailand and C Vietnam; also Andaman and Nicobar Is, but possibly only non-breeding visitor to latter. Winters S to N Vietnam and Malay Peninsula, with apparently small numbers reaching Sumatra.



Descriptive notes. 17 cm; 24 g. Adult male glossy green above and from chin to upper breast, belly white with green and bronze bars, underside of wing with white band; eye-ring orange-red, iris red to red-brown, bill orange with black tip, feet green. Female bronze-green above, crown and nape light rufous, tail barred chestnut and black, green in centre; white below, tinged rufous on throat and flanks, barred with bronze; iris brown, bill yellow with black tip, feet brownish green. Juvenile variable, head rufous (some white-barred on crown) or barred green and white, or head and mantle rufous, back and wing-coverts barred rufous and bronze-

green, or rufous and brown, tail barred brown and rufous; throat and breast rufous with bronze bars, belly white barred with brown, white underwing band; bill black above, flesh below, feet grey. **VOICE.** A "chweek" in flight; a trill; also loud whistled twitters.

Habitat. Dense evergreen forests, broadleaf secondary forest, outside breeding season also sometimes orchards and gardens. Lowlands to 2500 m in Nepal and Myanmar, to 1800 m in Thailand, lower in winter.

Food and Feeding. Insects, feeding on ants, caterpillars, bugs. Forages mainly in tree canopy, often taking prey on the wing.

Breeding. Breeds Apr-Jul. Brood-parasitic: hosts Crimson Sunbird (*Aethopyga siparaja*) and Little Spiderhunter (*Arachnothera longirostris*) in India. Eggs whitish, blotched with light brown or reddish brown; 17 x 12 mm; identification based on egg seen to hatch and develop into juvenile of present species.

Movements. Resident or partially migratory in India, but details uncertain; nomadic and local migrant, as are other parasitic cuckoos. Summer visitor to Nepal Apr-Aug, few in Sept, and also summer visitor to Tibet, but apparently resident in Yunnan and Hainan; in Thailand, some are residents (as also in Myanmar?), but species is also recorded there more widely as a winter visitor. Probably only a winter visitor in Malay Peninsula, but reported by some to be present all year. Winters also S to Sumatra (4 records). Single record (type specimen) from Sri Lanka, presumably a vagrant.

Status and Conservation. Not globally threatened. Scarce in Nepal and probably elsewhere in NW of range; similarly scarce in Myanmar, and uncommon in Thailand. Overall situation poorly known, but species appears to be at best uncommon in any part of range, both in breeding and in wintering areas. **Bibliography.** Ali & Ripley (1981), Baker (1906-1907, 1908, 1934), Becking (1981), Cheng Tsohsin (1987), Deignan (1945), Étchécopar & Hùe (1978), Friedmann (1968), Harrison (1969b), Legge (1880), Lekagul & Round (1991), MacKinnon & Philipps (1993), van Marle & Voous (1988), Medway & Wells (1976), Meyer de Schauensee (1984), Ripley (1982), Smythies (1986), Stepanyan (1995), Yang Lan *et al.* (1995).

38. Violet Cuckoo

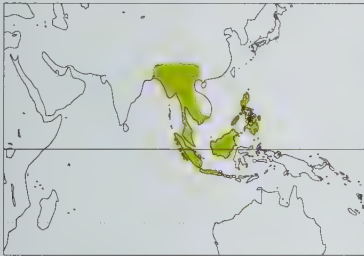
Chrysococcyx xanthorhynchus

French: Coucou violet

German: Amethystkuckuck

Spanish: Cucillo Violeta

Taxonomy. *Cuculus xanthorhynchus* Horsfield, 1821, Java. Asian and Australasian forms of *Chrysococcyx* sometimes placed in genus *Chalcites*. Two subspecies recognized. **Subspecies and Distribution.** *C. x. xanthorhynchus* (Horsfield, 1821) - NE India and Bangladesh E to Myanmar, Thailand and SC China (Yunnan), and S through Malay Peninsula and Indochina to Greater Sundas and SW Philippines (Palawan). *C. x. amethystinus* (Vigors, 1831) - Philippines (Basilan, Cebu, Luzon, Mindoro, Samar, Mindanao, Catanduanes).



Descriptive notes. 16 cm; 21 g. Adult male glossy violet above and on head, tail blackish with white tip, outer feathers barred; chin to upper breast bright violet, belly white with broad black, violet or green bars; eye-ring red, iris red to brown, bill yellow with orange-red base. Female greenish bronze above, crown dark brown, white markings around eye (and sometimes on forehead), central tail greenish, remainder rufous with greenish bars, outer rectrices barred black and white; breast whitish with bronze-green bars and variably washed rufous; iris brown, bill brown, feet olive-green. Juvenile barred rufous and greenish bronze above, crown bright rufous.

wing rufous and green or rufous and brown, tail barred brown and rufous, brown-barred white below, iris and bill dark brown. Male *amethystinus* glossy blue-violet, less reddish violet. VOICE. A “che-wick”, often in flight; also shrill descending trill preceded by a triple note “seer-se-seer, seeseeseeseese”.

Habitat. Secondary evergreen forests, deciduous forest, forest edge, orchards, gardens, mangroves, rubber plantations in Borneo. Lowlands and lower hill slopes to 1500 m, mostly below 700 m.

Food and Feeding. Insects, including caterpillars, flies, ants, beetles; also fruit. Creeps up and down branches, also flycatches; usually perches motionless.

Breeding. Brood-parasitic: hosts in India thought to be mainly sunbirds (*Aethopyga*) and spiderhunters (*Arachnothera*). Eggs unknown.

Movements. Resident or migratory. N populations including those in Assam and Bangladesh, appear to be migratory; S populations are resident.

Status and Conservation. Not globally threatened. Vulnerable to deforestation throughout its range. In breeding season, widespread but scarce in Myanmar, and uncommon in Thailand; reportedly not uncommon in Sumatra, but now rare in Java; not uncommon in Sarawak, and locally common in Sabah; generally uncommon in Philippines. Uncommon in winter in India S of breeding range, and apparently only vagrant to Andaman and Nicobar Is.

Bibliography. Ali & Ripley (1981), Baker (1906-1907, 1934), Becking (1981), Cheng Tsohsin (1987), Dickinson *et al.* (1991), Engelbach (1932), Étchécopar & Hùe (1978), Friedmann (1968), Gilliard (1950b), Harrison (1969b), Hellebrekers & Hoogerwerf (1967), Lekagul & Round (1991), MacKinnon & Philipps (1993), van Marle & Voous (1988), Medway & Wells (1976), Parker (1981), Parkes (1971a), Ripley (1982), Round (1988), Smythies (1981, 1986), Thewlis *et al.* (1996), Thompson *et al.* (1993).

39. Yellow-throated Cuckoo

Chrysococcyx flavigularis

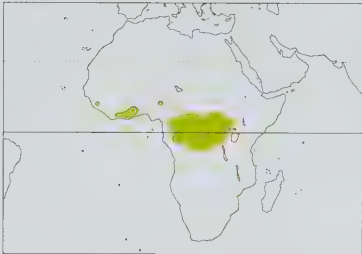
French: Coucou à gorge jaune

German: Gelbkehlkuuckuck

Spanish: Cucillo Gorgigualdo

Other common names: Yellow-throated Green Cuckoo

Taxonomy. *Chrysococcyx flavigularis* Shelley, 1880, Elmina, Ghana. Birds in Cameroon, Zaire and Uganda recently described as race *parkesi* based on darker belly and undertail-coverts of a few female and young male specimens, but most appear to be indistinguishable from those in W of range. Monotypic. **Distribution.** Forest zone from Sierra Leone and Ghana through Nigeria, S Cameroon and Gabon to Zaire, SW Sudan and SW Uganda. **Descriptive notes.** 19 cm; 30 g. Adult male bronze-washed dark coppery-brown above and on neck sides, outer rectrices white with subterminal black bars; chin, throat and centre of breast bright yellow, sides of throat and breast dark green, below barred buff and greenish brown; eye-ring yellowish green, iris yellow, bill greenish yellow, feet yellow. Female lacks green and yellow on throat, face and underparts finely barred rufous and dark brown; bill black, feet dull yellow. Juvenile barred greenish and buff above. VOICE. Clear flute-like whistle of 9-12 notes on same pitch, first the longest, accelerating



and then fading away, series lasting c. 3 sec; also both sexes give 2-note whistle, second note lower, “dhuitt-tiu”. Sings all year.

Habitat. Primary forest canopy, old secondary and gallery forest; usually remains high in forest canopy, where identified by its song. Lowlands.

Food and Feeding. Insects, mainly caterpillars, also beetles; fruit.

Breeding. In Liberia, egg in Mar. Presumably brood-parasitic: hosts unknown. Broken oviduct egg pale green with blackish blotches (Liberia). **Movements.** Resident.

Status and Conservation. Not globally threatened. Rare in W Africa, but locally more common in C Africa; most records are in the Congo basin, but species occurs regularly in C Nigeria (Kagoro); uncommon in Sierra Leone, with most records from NC, in open country with patches of forest. Only one definite record in S Sudan.

Bibliography. Ash (1990), Bannerman (1953), Britton (1980a), Brosset & Érad (1986), Cheke & Walsh (1996), Christy & Clarke (1994), Dickerman (1994), Dowsett & Forbes-Watson (1993), Dyer *et al.* (1986), Elgood *et al.* (1994), Friedmann (1956, 1968, 1969), Fry *et al.* (1988), Grimes (1987), Lippens & Wille (1976), Louette (1981), Mackworth-Præd & Grant (1957, 1970), Nikolaus (1987), Short *et al.* (1990), Snow (1978), Traylor & Archer (1982).

40. Klaas's Cuckoo

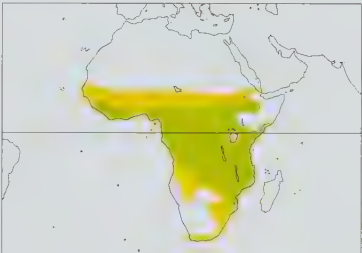
Chrysococcyx klaas

French: Coucou de Klaas

German: Klaaskuckuck

Spanish: Cucillo de Klaas

Taxonomy. *Cuculus Klaas* Stephens, 1815, Cape Province. Birds from Arabia were proposed as possible race *arabicus*. Monotypic. **Distribution.** Senegal E to Sudan and Ethiopia and S to South Africa, including Bioko (Fernando Póo); possibly also in SW Arabia, where status unclear.



Descriptive notes. 18 cm; 26 g. Adult male metallic green above, green patch from back down side of neck, white streak behind eye, outer tail white; white below, flanks barred green; eye-ring green, iris dark brown, bill green, feet greenish. Female has metallic green replaced by grey-brown, this extending down sides of neck and breast, back barred green and brown, white below, finely barred brown, iris light brownish grey; some females in W Africa have male-like plumage. Juvenile barred green and buff above, wing barred; white below, all barred dull green, green bars narrower than white, iris hazel. VOICE. Two clear whistles, “mei-tjie”, the first slurred

up, the second slurred down.

Habitat. Open woodland, forest edge, thickets; in Sierra Leone, particularly common in areas of forest/savanna mosaic; nearly all records (84%) in E Africa are within 500+ mm rainfall region. Lowlands to 3000 m.

Food and Feeding. Insects, mainly caterpillars, also butterflies, bug nymphs, beetles, small Orthoptera, termites. Forages in foliage, and occasionally flycatches.

Breeding. Breeds in rains, Sept-Nov in Senegambia, Mar-Sept in Nigeria, Dec-Jun E of Rift Valley in E Africa, Oct-Feb in Malawi, during winter rains in Jul-Sept in Cape region of South Africa. Brood-parasitic: hosts small insectivorous songbirds, mainly warblers and sunbirds. Eggs variable (white, greenish white, blue), spotted with brown or rufous; 19 x 13 mm; incubation 11-12 days. Hatchling naked, skin brown, darkens to deep blackish olive, bill dark horn, iris grey-brown, gape orange; evicts host's eggs and young; nestling period 19-21 days.

Movements. Resident in equatorial areas. Seasonal migrant at higher latitudes, arriving in rains, leaving after end of rains, although some remain in non-breeding season, when silent. In N Senegal occurs only in rainy season, in Ghana mainly a wet-season visitor, in N Togo in rains, and in S Togo throughout the year. Occasional records in SW Arabia, where possibly breeds.

Status and Conservation. Not globally threatened. A widespread and generally common species; persists in residential areas where flowers are available for sunbird hosts. Although there are no breeding records from Arabia, it is thought that this cuckoo may be a rare breeding resident in the SW. N to the Tihamat.

Bibliography. Amadon (1953), Ash & Miskell (1983), Bannerman (1953), Benson & Benson (1977), Benson *et al.* (1971), Berger (1955), Bishop *et al.* (1995), Bouwman (1995), Britton (1980a), Cave & Macdonald (1955), Chapin (1954), Cheke & Walsh (1996), Christy & Clarke (1994), Colston & Curry-Lindahl (1986), Dowsett & Forbes-Watson (1993), Elgood, Fry & Dowsett (1973), Elgood, Heigham *et al.* (1994), Evans, M.I. (1994), Every (1986), Follett (1990), Friedmann (1956, 1968), Fry *et al.* (1988), Ginn *et al.* (1989), Gray (1982), Greig-Smith (1976), Grimes (1987), Hanmer (1982, 1995), Hockey *et al.* (1989), Irwin (1987), Jackson & Sclater (1938), Jennings (1981a, 1995), Jensen & Clinning (1974), Jensen & Jensen (1969), Lewis & Pomeroy (1989), Lippens & Wille (1976), Mackworth-Præd & Grant (1957, 1962, 1970), Maclean (1993), MacLeod & Hallack (1956), Masterson (1953), McGill (1994), Nickalls (1983), Nikolaus (1987), Payne (1973), Payne & Payne (1967), Penry (1994), Pérez del Val (1996), Pinto (1983), Porter *et al.* (1996), Rowan (1983), Serle (1965), Short *et al.* (1990), Siegfried (1985), Snow (1978), van Someren (1956), Sweetman (1979), Zimmerman (1972), Zimmerman *et al.* (1996).

41. African Emerald Cuckoo

Chrysococcyx cupreus

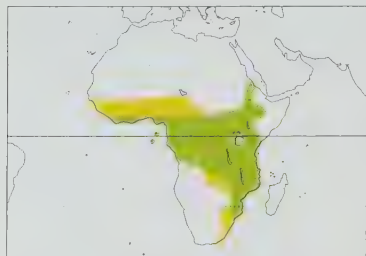
French: Coucou foliotocol

German: Smaragdckuckuck

Spanish: Cucillo Esmeralda Africano

Other common names: Emerald Cuckoo

Taxonomy. *Cuculus cupreus* Shaw, 1792, Gambia. Sometimes treated as polytypic, with races based on length of tail and wing, with tail length shorter on São Tomé, Príncipe and Pagalu (*insularum*), intermediate on Bioko (*intermedius*), longer in most of continental Africa (*cupreus*) and short in S Africa (*sharpae*), and on markings on undertail-coverts, but these traits overlap considerably between regions. Monotypic. **Distribution.** Sub-Saharan Africa from Gambia and S Senegal to S Sudan and N Ethiopia, S to N Angola and E South Africa; also Gulf of Guinea islands.



Descriptive notes. 20 cm; 38 g. Adult male brilliant iridescent green above, head and breast green, belly yellow; eye-ring blue, iris brown, bill green, slaty below, feet bluish. Female barred green and rufous above, face brownish and finely barred white, whitish below with greenish bars, breast washed buff, eye-ring bluish green, iris dark brown, bill black-tipped. Juvenile barred green and brown above, head barred green and white, below barred white and green (green bars as wide as white). **VOICE.** Song a clear 4-part slurred whistle, "hello, Ju-dy", the second note low in pitch, the last note highest.

Habitat. Forest, seasonal miombo (*Brachystegia*) woodland, savanna woodland, secondary growth, thickets, large shade trees, even in towns and suburbs, where it sings in introduced eucalypts. Occurs in lowlands in W Africa; in Kenya from lowlands to 2000 m highland forest "islands" in semi-arid regions, nearly all in 500+ mm rainfall region; in Ethiopia to 3000 m.

Food and Feeding. Insects, mainly hairy caterpillars (e.g. *Agathodes tomenis* on São Tomé), also beetle grubs, grasshoppers, butterflies, termites; some fruit, also bird eggs, snails. Forages in dense canopy foliage; usually remains high in trees.

Breeding. Breeds in rains, mainly Sept-Nov in S Africa, in long rains (when hosts breed) in Kenya, in Sept-Mar in Gabon. Brood-parasitic: hosts small songbirds, e.g. bulbuls, warblers, sunbirds (*Nectarinia*) and weavers, mainly insectivorous, though one host, Yellow-whiskered Greenbul (*Andropadus latirostris*), raises the young cuckoo on a diet of fruit. Eggs colour variable: white, pink or pale blue, usually marked with brown, or bluish grey with brown spots and blotches, or rose-red with brown cap, or rose-salmon with circle of red speckles; no evidence of mimicry of host eggs; 20 x 15 mm; female removes host's egg; incubation up to 13 days. Hatchling naked, skin pinkish yellow, darkening with age, upper mandible whitish, gape orange; evicts host's eggs and young; nestling period 18-20 days, cared for by foster parents up to 2 weeks after fledging.

Movements. Seasonal migrant in S Africa, some remaining in dry season, when silent and difficult to observe; mainly resident in E Africa; local resident or partial migrant with rains in W Africa. Resident in forest areas, and arrives with rains in gallery forests in the N savannas.

Status and Conservation. Not globally threatened. Fairly common; infrequently observed when high in dense foliage, but conspicuous when singing. Reported to be common in parts of S Africa. In late 19th century this species was common in Gambia and in Casamance, S Senegal, but is now rare in those areas; numbers decreased in Togo through hunting. In Sierra Leone, common in E but only casual elsewhere, and generally restricted to forest or areas where sufficient tall trees remain.

Bibliography. Amadon (1953), Atkinson *et al.* (1994), Bannerman (1953), Benson & Benson (1977), Benson *et al.* (1971), Berger (1955), Britton (1980a), Brosset (1976b), Brosset & Érad (1986), Cave & Macdonald (1955), Cheke & Walsh (1996), Christy & Clarke (1994), Colston & Curry-Lindahl (1986), Dechant (1996), Desfayes (1975), Dowsett & Forbes-Watson (1993), Elgood, Fry & Dowsett (1973), Elgood, Heigham *et al.* (1994), Friedmann (1956, 1966, 1968), Fry *et al.* (1988), Ginn *et al.* (1989), Goodwin (1988), Gore (1990), Grimes (1987), Jensen & Jensen (1969), Jones & Tye (1988), Lewis & Pomeroy (1989), Lippens & Wille (1976), Lockhart & Kakebecke (1992), Mackworth-Praed & Grant (1957, 1962, 1970), Maclean (1993), Moreau & Chapin (1951), de Naurois (1979, 1994), Nikolaus (1987), Oatley (1980), Pérez del Val (1996), Pinto (1983), Rowan (1983), Rutgers & Norris (1972), Ryves (1959), Short *et al.* (1990), Snow (1978), van Someren (1956), Vincent (1965), Worman (1930), Zimmerman (1972), Zimmerman *et al.* (1996).

42. Diederik Cuckoo

Chrysococcyx caprius

French: Coucou didric

German: Goldkuckuck

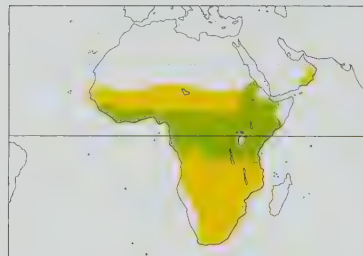
Spanish: Cuculillo Didric

Other common names: Did(e)ric Cuckoo

Taxonomy. *Cuculus caprius* Boddaert, 1783, Cape of Good Hope.

Possible shorter-winged race, *chrysoclorus*, has been described as resident in W Africa, along with long-winged birds, but short-winged individuals also occur in S Africa. Monotypic.

Distribution. Sub-Saharan Africa; also S Arabia.



Descriptive notes. 19 cm; 32 g. Adult male glossy bronze-green above, white supercilium broadest behind eye, white spots on wings and tail sides; white below, flanks barred green; eye-ring red, iris red, bill black, feet grey. Female often duller, some rufous above, throat usually washed buff, breast often lightly streaked, eye-ring brown, iris hazel-brown to grey (sometimes with dark flecks). Juvenile dull green or bright rufous (or both) above, with spots (not streaks) on breast, barred flanks, iris brown, bill red. **VOICE.** Male has clear emphatic whistle, first notes often rising in pitch, "de-dee-dee-diederik", also gives wavering "weahweahweahweah" when advertising with a caterpillar to female; female call "deah deah deah..."

Habitat. Semi-arid thorn scrub, acacia savanna, open woodlands, and edge of marshland habitat; locally also in gardens, e.g. in Douala, Cameroon; in semi-arid regions occurs around water, often near weaver colonies, where it is chased by the nesting weavers. Sea-level to c. 2000 m, generally below 1200 m.

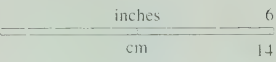
Food and Feeding. Insects, mainly caterpillars, also grasshoppers, termites, beetles, adult Lepidoptera, eggs of host birds; seeds. Forages mostly in canopy; may also seek food on ground, e.g. in W Africa.

Breeding. Breeds with rains, lays Aug-Oct in N Senegal, Aug-Nov in Sierra Leone, Sept-Oct in W Mali, Mar-Jul in coastal districts of Ghana, mainly Apr-Sept in N Nigeria, Oct-Apr in Malawi, in both short rains (Apr-May) and long rains (Nov-Jan) at semi-arid L Baringo in Kenya, in South Africa from late Oct to mid Jan in E Cape. Brood-parasitic: hosts mainly weavers (*Ploceus*), bishops (*Euplectes*) and sparrows (*Passer*), others include wagtails (*Motacilla*); more than one female may use a single tree in a weaver colony. Eggs variable, white, greenish or blue, unspotted or spotted, often match colour and pattern of host's; 21 x 15 mm; incubation 12 days. Hatchling naked, skin pink, darkening to blackish, bill orange to red, gape red; when 2 days old evicts host's eggs and young; fledges in 19-21 days, remaining with foster parents for 3 more weeks.

Movements. Resident in low-latitude tropics; also an intra-African migrant, seasonal in N and S of range. The long-winged individuals in W Africa are possibly non-breeding migrants from S Africa, but no ringing recoveries or other positive evidence of two morphologically distinct populations are known. In S Arabia, appears as a summer visitor, e.g. in Oman May-Oct. In N Senegal a seasonal visitor in the rains, but present all year in the S; in Gambia Jun-Nov; in Ghana occurs mainly in wet season, a seasonal visitor in the N; in N Nigeria present during rains May-Oct, then migrates S for the dry season; in Sudan a breeding visitor in rains, except resident in extreme S; in Kenya a wet-season visitor in dry areas; in Malawi, most are present and sing Oct-Mar, though a few are observed in other months as well. In Sierra Leone, after breeding many birds withdraw to forest canopy where recorded Nov-Apr, and from late Feb to late Mar species hardly recorded outside forest; local movements probably correlated with caterpillar abundance. In Gabon it appears in savannas as a non-breeding visitor from the Sahel in Jan-Feb, and is a local resident at all seasons around weaver colonies. Accidental in Cyprus and Israel.

Status and Conservation. Not globally threatened. Generally common throughout much of its expansive range in fair variety of habitats, often quite heavily humanized; frequently fairly conspicuous due to its characteristic voice, and seen especially around colonial nesting ploceids.

Bibliography. Amadon (1953), Ash & Miskell (1983), Bannerman (1953), Benson & Benson (1977), Benson & Serventy (1957), Benson *et al.* (1971), Berger (1955), Bouwman (1995), Bowen (1983a), Britton (1980a), Brooke & Borrett (1972), Bruggers & Bortoli (1979), Cave & Macdonald (1955), Chalton (1976, 1991), Cheke & Walsh (1996), Christy & Clarke (1994), Clancey (1990), Coetsee (1982), Colebrook-Robjent (1975, 1977, 1980, 1984), Colston & Curry-Lindahl (1986), Cramp (1985), Dowsett & Forbes-Watson (1993), Elgood, Fry & Dowsett (1973), Elgood, Heigham *et al.* (1994), Evans, M.I. (1994), Ferguson (1994), Friedmann (1930a, 1956, 1968), Fry *et al.* (1988), Ginn *et al.* (1989), Giraudoux *et al.* (1988), Gore (1990), Greig-Smith (1976), Grimes (1987), Grobler (1974), Hanmer (1995), Hockey *et al.* (1989), Hunter (1961), Iversen & Hill (1983), Jackson, F.J. & Sclater (1938), Jackson, W.M. (1992), Jennings (1995), Jensen (1966, 1980), Jensen & Jensen (1969), Jensen & Vernon (1970), Kemp *et al.* (1972), Lamarche (1980), Lawes & Kirkman (1996), Lewis & Pomeroy (1989), Lippens & Wille (1976), Lobb (1983), Lorber (1985), Lynes (1925), Macdonald (1980b), Mackworth-Praed & Grant (1957, 1962, 1970), Maclaren (1952), Maclean (1993), Markus (1964), Nikolaus (1987), Ottow & Duve (1965), Pakenham (1979), Payne (1967, 1973, 1974), Payne & Payne (1967), Penry (1994), Pérez del Val (1996), Pinto (1983), Reed (1953, 1968), Richardson (1983), Rowan (1983), Rowan & Broekhuysen (1962), Rutgers & Norris (1972), Short *et al.* (1990), Skead (1952), Smith, L.J. (1987), Snow (1978), Zimmerman (1972), Zimmerman *et al.* (1996).



Genus *RHAMPHOMANTIS* Salvadori, 1878

43. Long-billed Cuckoo

Rhamphomantis megarhynchus

French: Coucou à long bec **German:** Langschnabelkuckuck **Spanish:** Cucillo Piquilargo
Other common names: Little Long-billed Cuckoo

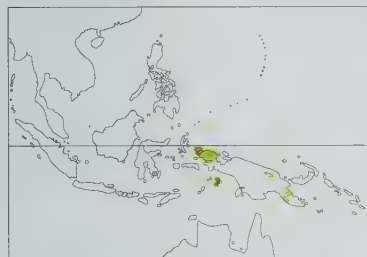
Taxonomy. *Cuculus megarhynchus* G. R. Gray, 1858, Aru Islands.

Race *sanfordi* known only from one specimen, claimed to be an adult female; in type description, this bird would appear rather similar to juveniles of nominate race; as juvenile and subadult plumages of this species have only very recently begun to be understood, validity of race *sanfordi* probably requires reassessment. Two subspecies recognized.

Subspecies and Distribution.

R. m. megarhynchus (G. R. Gray, 1858) - New Guinea (Vogelkop and interior of N coast E to Kumusi R) and Aru Is.

R. m. sanfordi Stresemann & Paludan, 1932 - Waigeo I.



Descriptive notes. 18 cm; 31 g. Adult male dark brown above, head black, dull greyish brown below; eye-ring and iris red, long bill black with drooping tip. Female dark cinnamon above, head dark grey-brown; breast and belly rufous buff and finely barred, lower breast cinnamon; iris dark brown with narrow cream outer ring. Juvenile cinnamon above, face pale grey and brown, eye-ring dark, iris dark brown. Race *sanfordi* female said to have breast greyer, contrasting with rufous belly; male undescribed. Voice. Loud, distinct trill, a descending series of evenly spaced notes, lasting 4 sec. and repeated at 5-sec intervals.

Habitat. Tall forests (c. 70 m high) and openings in them; occurs in lowlands.

Food and Feeding. Insects, mainly caterpillars, also flying ants. Gleans prey from foliage, branches or bark.

Breeding. Unknown. Female with egg in oviduct ready to lay in Sept.

Movements. Unknown.

Status and Conservation. Not globally threatened. Species is generally rare and local; because of its restricted range, it has in the past been considered near-threatened. Extensive research required on biology, ecology and population sizes of this unusual species.

Bibliography. Andrew (1992), Anon. (1994a), Beehler, Burg *et al.* (1994), Beehler, Pratt & Zimmerman (1986), Coates (1985), Finch (1978, 1979a), Jepson (1997), Rand & Gilliard (1967), Ripley (1964), Stein (1936).

Genus *SURNICULUS* Lesson, 1830

44. Asian Drongo-cuckoo

Surniculus lugubris

French: Coucou surnicou d'Asie **German:** Drongokuckuck **Spanish:** Cucillo-drongo Asiático
Other common names: Drongo Cuckoo (together with *S. velutinus*)

Taxonomy. *Cuculus lugubris* Horsfield, 1821, Java.

Forms a superspecies with *S. velutinus*, with which commonly considered conspecific, but song and juvenile plumage are distinct. Four subspecies recognized.

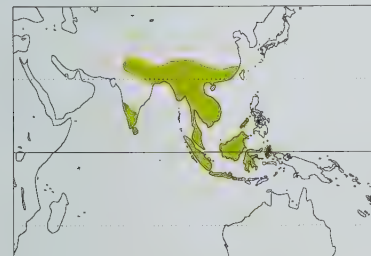
Subspecies and Distribution.

S. l. dicruroides (Hodgson, 1839) - Punjab and lower Himalayas E through Nepal to Assam and Manipur, and from SC China (Sichuan, Yunnan, Fujian, Hainan) S through Myanmar and Thailand to Indochina; winters S to Malaysia, Sumatra (and Nias) and Java.

S. l. lugubris (Horsfield, 1821) - SW coast of India (S of Goa), Sri Lanka, Java and Bali.

S. l. brachyurus Stresemann, 1913 - Malaysia, Sumatra and Bangka, Borneo and SW Philippines (Palawan, Balabac, Calauit).

S. l. musschenbroeki A. B. Meyer, 1878 - Sulawesi and Butung to Bacan and Halmahera (N Moluccas).



Descriptive notes. 25 cm; 35 g. Adult glossy black, tail square or slightly forked, white leggings, white bands on undertail-coverts, white bar on underwing; skin around eye blackish, iris brown, bill black, feet dark grey. Juvenile dull black, with white spots on head, wings and breast. Race *dicruroides* larger; *brachyurus* shorter-tailed; *musschenbroeki* velvet-purple on head, tail square. VOICE. Loud clear whistles rising up the scale, "one, two, three, four, five, six"; also a shrill crescendo; often calls at night. In Sulawesi, song has 8 notes in rapid succession and equal pitch, then a pause before a new series. In Bacan, 5-8 notes, usually 6. In Halmahera, reported as slightly different in quality from song of Malaysian birds, with series of 6-8 notes, occasionally as many as 12; a song recorded on Halmahera (range of *musschenbroeki*) was like that of *S. velutinus* of Philippines, but juvenile collected on Halmahera has plumage as other juvenile *S.*

velutinus of Philippines, but juvenile collected on Halmahera has plumage as other juvenile *S.*

lugubris. Also a "crescendo" call, a rapidly trilled series of rising notes ending with c. 3 descending notes, with harsh tonal quality like a call of *Cuculus clamosus*.

Habitat. Forests and scrub, forest edge and clearings, open forests and bamboo jungle in Myanmar, interior of dry forests in Sri Lanka; occasionally gardens, mangroves. Mainly lowlands, but in Nepal to 1500 m, occasionally 2000 m, in Yunnan to 2100 m; in Myanmar and Thailand to 1200 m, in Peninsular Malaysia to 800 m, in Sarawak to 1200 m, in Sulawesi at 300 m and 500 m, on Halmahera at 250 m.

Food and Feeding. Insects, caterpillars (hairy and hairless; Pieridae, Lasiocampidae, Limadodidae), other soft insects, spiders; sometimes fruit, especially figs. Forages in foliage canopy, also perches on charred stumps and saplings in recently burned clearings.

Breeding. Breeds Jun in Nepal, Mar-Oct in N India, Jan-March in Kerala, Dec-May in Sri Lanka, based on song, enlarged gonads and breeding of hosts. Brood-parasitic, with hosts mainly babblers: in India, Nepal *Fulvetta (Alcippe nipalensis)* and Dark-fronted Babbler (*Rhopocichla atriceps*), also fork-tails (*Enicurus*), Sooty-headed Bulbul (*Pycnonotus aurigaster*), ioras (*Aegintha*), shrikes (*Lanius*) and Striated Warbler (*Megalurus palustris*); in Sri Lanka *R. atriceps*; in Malaysia, Striped Tit-babbler (*Macronous gularis*) and Horsfield's Babbler (*Malaccocincla sepiarium*); in Java, *M. sepiarium*, Grey-cheeked Tit-babbler (*Macronous flavicollis*) and Chestnut-chested Babbler (*Stachyris melanothorax*); in Borneo, Chestnut-winged Babbler (*Stachyris erythroptera*). *Macronous gularis* mob this cuckoo, apparently recognizing it as their brood parasite; no evidence that drongos (*Dicrurus*) are used as hosts, even though Hair-crested Drongo (*D. hottentottus*) seen to call and chase a cuckoo (drongos are aggressive, and chase many other species). Eggs white with fine purple blotches in Borneo, similar oviduct egg in Nepal; in Java, pale salmon-pink with brownish, purplish or grey markings; 20 x 15.5 mm. Nestling has mouth-lining bright red, feet vinaceous; evicts host's eggs and chicks.

Movements. Resident, seasonally migratory and nomadic, appearing with monsoon rains. In Nepal, a summer visitor Apr-Nov. Northernmost race *dicruroides* winters S to Malaysia and Greater Sundas; accidental Japan.

Status and Conservation. Not globally threatened. Like many other forest birds, this species is subject to the effects of widespread habitat destruction throughout its range. In Myanmar, sparingly distributed throughout, while generally uncommon in Thailand and Greater Sundas. In Malaysia, fairly common at Taman Negara; in Singapore it occurs as a rare resident and commoner migrant in secondary forest, particularly Catchment Forest and Bukit Timah Nature Reserve. In Sri Lanka, rare in low-country dry zone. Widespread in Sulawesi, and now considered to be not uncommon to rather common.

Bibliography. Ali & Ripley (1981), Ali & Whistler (1937), Ali *et al.* (1996), Andrew & Holmes (1990), Baker (1906-1907, 1934), Becking (1981), Biswas (1960), Brazil (1991), Cheng Tsohsin (1987), Coates & Bishop (1997), Cranbrook & Wells (1981), Deignan (1945), Dickinson *et al.* (1991), Duckworth (1997), Etchécopar & Hùe (1978), Harrison (1969b), Harvey (1990), Hellebrekers & Hoogerwerf (1967), Lambert (1994b), Lambert & Young (1989), Legge (1880), Lekagul & Round (1991), MacKinnon & Philipps (1993), Madoc (1976), van Marle & Voous (1988), Medway & Wells (1976), Mees (1986), Osmaston (1916), Phillips (1978), Ripley (1944, 1946, 1982), Roberts, T.J. (1991), Smythies (1960, 1981, 1986), Sody (1989), Stepanyan (1995), Stresemann (1913a), Wait (1925), Watling (1983), Wells & Medway (1976), Whistler (1944), White & Bruce (1986).

45. Philippine Drongo-cuckoo

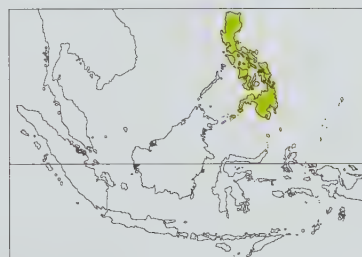
Surniculus velutinus

French: Coucou surnicou des Philippines **Spanish:** Cucillo-drongo Filipino
German: Philippinen-Drongokuckuck

Taxonomy. *Surniculus velutinus* Sharpe, 1877, Malamaui, Philippines.

Forms a superspecies with *S. lugubris*, and commonly considered conspecific, but song and juvenile plumage are distinct. Monotypic.

Distribution. Philippines and Sulu Is.



Descriptive notes. 23 cm; 36 g. Adult blackish, head and mantle velvety (not glossy, as in *S. lugubris*), wings and tail glossy purplish, blue or green, tail square; white bar on underside of wing; white leggings; iris brown, bill black, feet dark grey. Juvenile unmarked rusty-brown. VOICE. Song a series of 8-10 whistles, longer, more notes and less rise in pitch than in *S. lugubris*.

Habitat. Primary forest, secondary forest, mixed bamboo woodland. In Philippines, from sea-level to 1000 m.

Food and Feeding. Insects. Forages in forest canopy.

Breeding. Unknown.

Movements. Resident.

Status and Conservation. Not globally threatened. Although this species is fairly common in primary forest in the Philippines, this habitat is being rapidly removed by logging operations; to date, species has shown only limited capability of adapting to degraded habitat, so long-term effects of logging will surely prove markedly detrimental to the species.

Bibliography. Baker (1919), Delacour & Mayr (1946), Dickinson *et al.* (1991), DuPont (1971), Gilliard (1950b), Greenway (1978), Hachisuka (1934), Meyer de Schauensee & DuPont (1962), Parkes (1973), Rabor (1938), Rand & Rabor (1960), Ripley & Rabor (1958), Salomonsen (1953).

Genus *CALIECHTHRUS* Cabanis & Heine, 1863

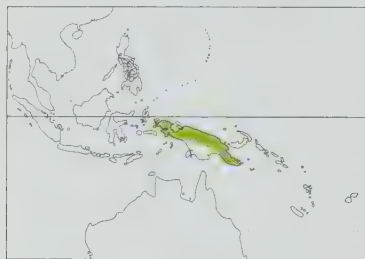
46. White-crowned Koel

Caliechthrus leucolophus

French: Coucou à calotte blanche **German:** Weißscheitelkoel **Spanish:** Koel Coroniblanco

Taxonomy. *Cuculus leucolophus* S. Müller, 1840, Lobo Bay, New Guinea. Monotypic.

Distribution. New Guinea and Salawati.



in canopy.

Breeding. Unknown.

Movements. Unknown.

Status and Conservation. Not globally threatened. Little information available on relative abundance; frequently recorded at Varirata National Park, near Port Moresby. Extensive research required on biology, ecology and population sizes of this unusual species.

Bibliography. Andrew (1992), Bailey (1992a), Beehler (1978b), Beehler, Burg *et al.* (1994), Beehler, Pratt & Zimmerman (1986), Burrows (1993), Coates (1985), Diamond (1972a), Eastwood (1995b), Gregory (1995a, 1995b), Hartert (1930), Jepson (1997), Mayr & Rand (1937), Rand & Gilliard (1967).

Descriptive notes. 33 cm; 117 g. Adult black, white stripe down crown, undertail-coverts barred white, tail tipped white; iris dark brown, bill black, feet dark grey. Juvenile black, barred white below, plumage softer. Voice. Loud, mournful repetitive song of 3 or 4 descending whistles, each series higher in pitch and more insistent. Also a call of 3-4 clear notes on same pitch, a ringing and laughing "cuo-cuo-cuo-cuo", and a single burry downslurred "whurr".

Habitat. Forest, mainly canopy in hilly country. Sea-level to 1500 m.

Food and Feeding. Mainly insects, including caterpillars, other arthropods; also fruit. Feeds

times recognized subspecifically (*dolosa*), being small and female having large rufous spots above, but overlap occurs with *malayana* of Malaysia and Sumatra. Seventeen subspecies recognized.

Subspecies and Distribution.

E. s. scolopacea (Linnaeus, 1758) - Nepal, Pakistan and India to Sri Lanka, Laccadives and Maldives.

E. s. chinensis Cabanis & Heine, 1863 - S China and Indochina; winters S to Borneo.

E. s. harterti Ingram, 1912 - Hainan.

E. s. malayana Cabanis & Heine, 1863 - E India and Bangladesh, through Myanmar, Thailand and Peninsular Malaysia to Andaman and Nicobar Is, Sumatra and Bangka, Borneo and Lesser Sundaes (Lombok, Sumbawa, Flores).

E. s. simalurensis Junge, 1936 - Simeulue and off-lying islands of Kokos and Babi (off NW Sumatra).

E. s. frater McGregor, 1904 - NE Philippines (Calayan and Fuga).

E. s. mindanensis (Linnaeus, 1766) - Talaud and Sangihe Is to Philippines (including Palawan).

E. s. melanorhyncha S. Müller, 1843 - Sulawesi.

E. s. facialis Wallace, 1863 - Sula Is.

E. s. corvina Stresemann, 1931 - N Moluccas (Morotai, Halmahera, Ternate, Tidore, Moti, Bacan).

E. s. orientalis (Linnaeus, 1766) - C Moluccas (Buru, Manipa, Kelang, Seram, Ambon, Tujuh, Watubela).

E. s. picata S. Müller, 1843 - Kai Is and Sumba to Timor and Roma.

E. s. rufiventer (Lesson, 1830) - New Guinea.

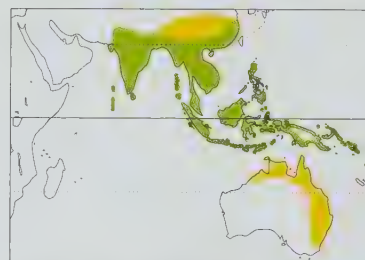
E. s. salvadorii Hartert, 1900 - Bismarck Archipelago.

E. s. alberti Rothschild & Hartert, 1907 - Solomon Is.

E. s. subcyanocephala Mathews, 1912 - N Australia E to W Queensland; migrant to New Guinea.

E. s. cyanocephala (Latham, 1801) - N Queensland to New South Wales.

Descriptive notes. 39-46 cm; male 215 g, female 234 g (*cyanocephala*), 230 g (Asian forms), 254-327 g (Indonesian and New Guinea forms). Adult male *scolopacea* glossy black, iris red, bill light green, feet grey. Female dark brown above with many white spots and bars, crown rufous with whitish streaks, tail barred black and brown; white below, throat spotted, breast and belly barred blackish brown. Juvenile like adult, buff tipping on breast and abdomen, female darker above with blackish head and breast, iris brown, bill black. Races differ mostly in plumage of females, and populations vary in extent of a distinct subadult



plumage. S Asian forms: *chinensis* larger, female with no rufous on crown; *harterti* smaller, longer-billed than *chinensis*; female *malayana* has pale areas washed rufous; *simalurensis* smaller, female with large rufous spots above; *mindanensis* with light areas more rufous, ventral barring narrower than *malayana*; *frater* similar, but larger; *corvina* juvenile smoky-black; female *orientalis* fewer and larger rufous spots above, below rich rufous with little or no barring, throat black or with black patches, bill pale grey, juvenile rufous-buff. Indonesian and New Guinea forms: *melanorhyncha* male with blue-violet gloss, bill black, iris red, female with red iris, pale malar streak, dark bill and polymorphic (like male but gloss more blue-green; or black-barred rusty-fawn below with throat and throat blackish or grey; or barred rufous and black above, buff with blackish bars below), juvenile all black or like black-and-buff female but with head to throat black; *picata* female variable (throat black, or variegated black and ochre, or two broad malar stripes separated by rufous stripe, spots and bars on back, wings and tail brownish, irregular thick black bars below); *rufiventer* smaller, female heavily spotted and barred rufous and black above, head and throat mainly rufous, underparts buff with fine dark barring; *salvadorii* larger than *rufiventer*, female markings similar (spots on lesser coverts whitish), below buffy-white with narrow black bars, bill slaty-blue; *alberti* much smaller, female buffy. Australian forms: *cyanocephala* male bill blue-grey to horn, female with black crown and face heavily streaked rufous, white stripe below eye, black throat sides, whitish below with fine blackish bars, iris red, bill light green, juvenile similar to female but rufous-crowned, throat buff to black, white to buff below with fine dark bars, iris brown, bill horn; *subcyanocephala* smaller, female with plain black crown. Voice. Loud and noisy; calls early, starting before dawn. Thailand: loud "ko-el" with stress on second note, also a bubbling "kwow kwow-kwov-kwov". Indonesia: loud shriek, "ko-el" or "kow-wow", emphasis on second syllable, a series of 5-10 phrases rising in tempo, pitch and loudness, day and night, also loud ringing "tweep" repeated 1-8 times; female gives shrill "kik-kik-kik-kik". New Guinea: (1) series of slurred notes rising in pitch, (2) rapid series of paired notes, rising then levelling in pitch; alarm a loud staccato "week week week WEEK...", female a loud "piip piip piip piip". Sulawesi: common call "kuow", also variety of loud ringing calls, frequently given before dawn. Solomon Is: 2 loud whistles, the second higher, "wo-wee", heard only at night. Australia: male a loud "kooel", a rising "quoy-quoy-quoy-quoy", a falsetto "quodel-quodel-quodel", and a rising "weir-weir-weir-weir!", female a shrill 4-note piping.

Habitat. Open forest, monsoon forest, edge and scrub, riverside scrub, plantations, orchards, gardens in towns and near human habitations, especially around figs (*Ficus*) and other fruiting trees, and mangroves. Mainly in lowlands: sea-level to 1200 m in SE Asia, to c. 1370 m (occasionally to 1800 m) in Nepal, to 1500 m in Sulawesi, to 1000 m in Australia.

Food and Feeding. Fruit, including figs (*Ficus*), berries of *Morus*, *Zizyphus*, papaya (*Carica papaya*) and other fruiting trees, e.g. Brazilian cherries (*Eugenia uniflora*), and tamarinds (*Tamarindus indica*), *Sterculia foetida*, and oil palm nuts and other palms (*Archontophoenix alexandrae*); also few insects (grasshoppers, caterpillars), snails, flower nectar. Arboreal, feeds in tree canopy; flight swift and direct. Nestlings are raised not only by insect-eating hosts but also by fruit-eating species such as figbirds (*Sphecotheres*), which feed both fruit and insects to young.

Breeding. Breeds Mar-Aug (mainly May-Jun) in India, Apr-Aug in Sri Lanka, Feb-Apr in Malaysia, and in Australia Oct-Feb in Queensland, Nov-Feb in Kimberley Division, Dec-Feb in Northern Territory. Brood-parasitic: hosts in India are House Crow (*Corvus splendens*) and Jungle Crow (*C. macrorhynchos*); in Peninsular Malaysia lays in nests of *C. macrorhynchos*; in Java and Sulawesi also of Slender-billed Crow (*C. enca*); in Sulawesi also parasitizes Sulawesi Crested Mya (*Basilornis celebensis*); in Greater Sundaes crows, drongos (*Dicrurus*) and orioles (*Oriolus*); on Palawan, Hill Mya (*Gracula religiosa*); in Australia large honeyeaters, including Noisy Friarbird (*Philemon carunculatus*) and Red Wattlebird (*Anthochaera carunculata*), also Magpie-larks (*Grallina cyanoleuca*), Olive-backed Oriole (*Oriolus sagittatus*) and Figbird (*Sphecotheres viridis*). Male may distract crow from its nest, allowing female to lay in it. Eggs in India grey-blue with small brown or black spots, like *Corvus* eggs but smaller, 31 x 23 mm; in Sulawesi (where all three forms of female breed) pink, spotted, 39 x 24 mm; in Australia salmon-pink, marbled reddish and violet-grey at large end, 34 x 24 mm. In Australia, 1 egg/host nest (more than one in India), incubation 13-14 days; hatchling (*cyanocephala*) naked, mouth-lining bright orange-pink; evicts host's eggs and young; fledges in 19-28 days, fed by hosts for another 2-3 weeks. In India, shorter incubation period than crows (13-14 days, against 16-20) allows cuckoo egg to hatch first, nestlings do not evict, but decrease host's success; adult female cuckoos seen to feed fledged juveniles.

Genus *MICRODYNAMIS* Salvadori, 1878

47. Dwarf Koel

Microdynamis parva

French: Coucou à tête noire

German: Schwarzkappenkuckuck

Spanish: Koel Enano

Other common names: Black-capped Koel

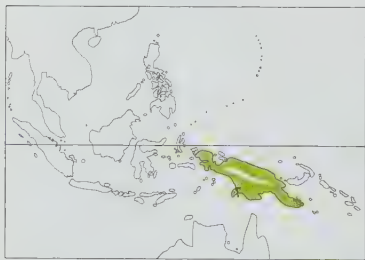
Taxonomy. *Eudynamis* [sic] *parva* Salvadori, 1875, Tidore; error = New Guinea.

Two subspecies recognized.

Subspecies and Distribution.

M. p. griseusens Mayr & Rand, 1936 - N New Guinea between Humboldt Bay and Kumusi R.

M. p. parva (Salvadori, 1875) - lowland forests of rest of New Guinea, and D'Entrecasteaux Is.



Descriptive notes. 20 cm; 43 g. Adult male brown above, crown and malar streak glossy black, white stripe below eye, underparts rich buff to buffy-white; iris red, bill black. Female brown, whitish stripe below eye, throat grey, iris red or hazel, feet blue-grey to black. Immature male has charcoal-grey throat stripe, brown crown. Juvenile like adult female, back feathers slightly barred (buff tip, blackish subterminal, brown base), outer webs of wing indistinctly barred rufous and dark brown, underparts indistinctly barred light and dark brown, rectrices edged rufous, eye-stripe distinct. Race *griseusens* much greyer above and below. Voice.

One song medium to high pitch, series of resonant upslurred whistled notes, "oouei touei touei ...", 1/ sec; another a rapid series of downslurred notes, rising in pitch and levelling at end.

Habitat. Forest. Lowlands to 1450 m.

Food and Feeding. Fruit.

Breeding. Details unknown. Courtship feeding recorded.

Movements. Apparently resident.

Status and Conservation. Not globally threatened. Widespread, and common to fairly common within its range, but poorly known. Extensive research required on biology, ecology and population sizes of this distinctive species.

Bibliography. Andrew (1992), Anon. (1994a), Austin & Kuroda (1953), Bailey (1992a), Beehler (1978b), Beehler, Burg *et al.* (1994), Beehler, Pratt & Zimmerman (1986), Coates (1985), Diamond (1972a), Eastwood (1995b), Fabbro (1995), Gregory (1995a, 1995b), Hartert (1930), Jepson (1997), Mayr (1936b, 1944a), Rand & Gilliard (1967).

Genus *EUDYNAMIS* Vigors & Horsfield, 1827

48. Common Koel

Eudynamis scolopacea

French: Coucou koël

German: Indischer Koel

Spanish: Koel Común

Other common names: Asian Koel (*scolopacea* group), Black-billed Koel (*melanorhyncha*); Australian/Blue-headed Koel (*cyanocephala* group)

Taxonomy. *Cuculus scolopaceus* Linnaeus, 1758, Malabar.

Genus name sometimes incorrectly spelt *Eudynamis*. Australian birds are sometimes treated as a separate species (*E. cyanocephala*), and black-billed populations of Sulawesi to Moluccas and New Guinea as another (*E. melanorhyncha*); while both *rufiventer* and *subcyanocephala* are present in New Guinea, however, they are not known to breed sympatrically as two distinct species; and two forms (*orientalis*, ?*cyanocephala*) occur on Seram, but it is unknown if both breed there; songs and calls appear to be similar for all forms throughout their collective range. Birds on Andaman and Nicobar Is are some-

Movements. Resident or makes irregular movements. Resident in tropical areas, nomadic and local migrant in temperate N parts of range; partial migrant in Nepal. Race *chinensis* migrates to Borneo. In S Myanmar, abundant March-July and apparently absent Aug-Nov. Australian populations migratory, many leave after breeding season; *cynocephala* spends austral winter in Indonesia, *subcynocephalus* in New Guinea. In Andaman and Nicobar Is, populations are variable in plumage, females ranging from rufous-crowned to no rufous on head, which suggests repeated immigration of birds from both India and Malay Peninsula. Irregular in Taiwan; vagrant to Oman.

Status and Conservation. Not globally threatened. A widespread species with range extending to remote islands in Indian Ocean, e.g. Maldives and Laccadives. Common through much of range, from Nepal and India to Myanmar, Thailand and Malaysia at least, but less common in Greater Sundas. Common also in Andaman and Nicobar Is.

Bibliography. Abdulali (1931, 1971), Ali & Ripley (1981), Ali *et al.* (1996), Andrew & Holmes (1990), Baker (1906-1907), Beehler *et al.* (1986), Beruldsen (1980), Blakers *et al.* (1984), Bowler & Taylor (1989), Brooker & Brooker (1989a), Cain & Galbraith (1956), Christidis & Boles (1994), Coates (1985), Coates & Bishop (1997), Crouther (1985), Crouther & Crouther (1984), Deignan (1945), Denny & Dudman (1979), Dewar (1907), Dickinson *et al.* (1991), Disney (1992), Dixit (1968), Étiénnecopar & Hùe (1978), Frauca (1967), Gill (1969), Gilliard & LeCroy (1967a), Goodman *et al.* (1995), Gosper (1962, 1964, 1997), Hall (1974), Hartert (1903b, 1925b), Hellebrekers & Hoogerwerf (1967), Hoogerwerf (1969), Junge (1936), Lamba (1969), Lekagul & Round (1991), MacKinnon & Phillips (1993), van Marle & Voous (1988), Mayr (1937, 1944a), Mayr & Rand (1937), McClure (1974), Medway & Wells (1976), Mees (1986), Menon & Shaw (1979), Osmaston (1916), Ottow & Verheijen (1969), Parkes (1971a), Patnaik (1981), Phillips (1948, 1978), Rabor (1977), Rand (1941a), Ray-Chaudhuri (1967), Ripley (1982), Ripley & Beehler (1989), Roberts, T.J. (1991), Rose (1997a), Schönwetter (1967), Siebers (1930), Smythies (1981, 1986), Sody (1989), Stepanyan (1995), Storr (1977, 1980, 1984b, 1991), Strahan (1994), Stresemann, E. (1914, 1940), Stresemann, V. & Stresemann (1961), Subrahmanyam & Krishnamoorthy (1980), Watling (1983), Webb (1997), White & Bruce (1986).

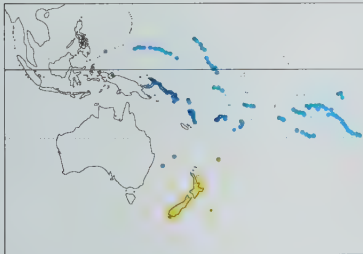
49. Long-tailed Koel

Eudynamis taitensis

French: Coucou de Nouvelle-Zélande **German:** Langschwanzkoel **Spanish:** Koel Colilargo

Taxonomy. *Cuculus taitensis* Sparrman, 1787, Tahiti. Formerly placed in monotypic genus *Urodynamis*. Current genus name sometimes incorrectly spelt *Eudynamis*. Monotypic.

Distribution. Breeds in New Zealand, Great and Little Barrier, Kapiti, Stewart and Chatham Is, and also Kermadecs. Migrates to Oceania, occurring from Palau, Carolines and Marshalls through Fiji, Tonga and Samoa to Cook, Society, Austral, Marquesas and Pitcairn Is; also Bismarck Archipelago, Solomons, Vanuatu, Norfolk I, Lord Howe I and elsewhere in SW Pacific.



Descriptive notes. 38-42 cm; 120 g. Adult male long-tailed, entirely rufous-barred brown above, head blackish with rufous streaks, white streak above eye; below, white to rufous with black streaks; iris yellow, bill yellow-horn, nostril slit-like. Some birds more rufous, typically females. Juvenile brown with white spots above, tail barred whitish, buff with black streaks below. VOICE. Whistled "ouit-ouit", also a magpie-like chatter and loud shrieks; sometimes several males call in an apparent social group or lek.

Habitat. Forest, scrub.

Food and Feeding. Insects, also crabs, lizards, eggs, nestling birds; preys on nestlings even

when in non-breeding area (Norfolk I).

Breeding. Breeding season Nov-Dec. Brood-parasitic: hosts songbirds, including Yellowhead (*Mohoua novaeseelandiae*), Whitehead (*M. albicilla*) and Brown Creeper (*Finschia novaeseelandiae*); potential hosts that nest early escape parasitization. Eggs whitish, marked with purplish brown and grey; 23.5 x 17 mm. Nestlings evict eggs and young; nestling period c. 21 days; fed for at least 2 weeks after fledging, sometimes attracting and fed by adults other than foster parents that reared them.

Movements. Long-distance migrant, moving seasonally from New Zealand to Melanesia, Micronesia and (mainly) Polynesia, where remains May-Sept; resident on Raoul (Kermadecs). Adults arrive in breeding area in Oct and depart in Jan or Feb. Migrates at night, giving loud calls in flight. Immatures remain in their tropical non-breeding areas, and do not return to New Zealand to breed until their 2nd year.

Status and Conservation. Not globally threatened. Populations of present species are decreasing in numbers with the loss of forest breeding habitats and also, in tandem, the reduction in populations of its host species. Situation requires close monitoring.

Bibliography. Baker (1951), Beehler *et al.* (1986), Blackburn (1968), Bogert (1937), Bregulla (1992), Chambers (1989), Christidis & Boles (1994), Clunie (1984), Coates (1985), Cunningham (1949, 1966), Dow (1972), Ellis *et al.* (1990), Engbring & Ramsey (1989), Falla *et al.* (1981), Gill (1980b), Hannecart & Létocart (1983), Hermes (1985),

Holyoak (1980), Holyoak & Thibault (1984), Kinsky (1957), Lacan & Mougín (1974), Mayr (1944a), McLean (1982, 1985, 1988), McLean & Waas (1987), Muse & Muse (1982), Oliver (1974), Pratt *et al.* (1987), Reed (1980a), Robertson (1985), Schodde *et al.* (1983), Sparrow (1984), St. Paul (1976), Stidolph (1949), Stresemann, E. & Stresemann (1966, 1969), Stresemann, V. & Stresemann (1961), Thibault & Rives (1988).

Genus *SCYTHROPS* Latham, 1790

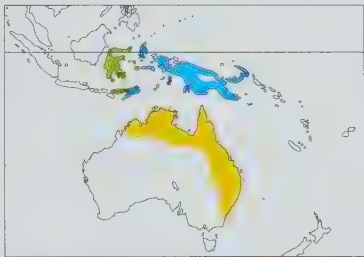
50. Channel-billed Cuckoo

Scythrops novaehollandiae

French: Coucou présageur **German:** Fratzenkuckuck **Spanish:** Cuco Tucán

Taxonomy. *Scythrops novae Hollandiae* Latham, 1790, New South Wales. Monotypic.

Distribution. Breeds in Sulawesi, Buru and Flores, and N & E Australia; rarely occurs in Tasmania. Winters in Moluccas, Lesser Sundas, Aru Is, New Guinea and Bismarck Archipelago.



Descriptive notes. 60 cm; male 604 g, female 623 g. The largest brood-parasitic bird. Adult grey above with black spots, head grey, tail grey with subterminal black band and white tip; light grey below, flanks barred; bill huge, usually described as pale grey, but in fact bicoloured with extensive dark grey base and pale tip; bare skin around eye reddish, iris red, feet grey. Juvenile with head and neck buff, large buff spots on wing, bill dark grey. Distinctive "Southern Cross" silhouette in flight; flies with slow and regular wingbeats. VOICE. Loud, raucous, repeated hoarse "gaak", also a rapidly repeated high nasal series, and a bubbling trumpeting.

Habitat. Canopy trees at edge of forest or along river, other open woodlands with tall trees and especially figs (*Ficus*), near coast inland from mangroves; occurs mainly in subhumid and semi-arid regions, also on coastal islands; scarce and patchy in arid zone. Lowlands.

Food and Feeding. Fruit, especially figs; also insects, including stick insects, beetles and locusts. Young in nest of currawongs (*Strepera*) are reared on fruit, young in nests of crows (*Corvus*) are often fed carrion.

Breeding. Breeds Feb-Jun in N Sulawesi, Oct-Nov in SE Australia, Nov-Jan in Kimberley Division, Oct-Jan in Queensland. Breeding male presents a large insect to female, then mates with her. Brood-parasitic, with all hosts large passerines, half size to same size as the cuckoo (mean size ranges 39-61 cm): Jungle Crow (*Corvus macrorhynchos*) and Flores Crow (*C. florensis*) in Flores; Slender-billed Crow (*C. enca*) in Sulawesi; Torresian Crow (*C. orru*) and other corvids, Pied Currawong (*Strepera graculina*), butcherbirds (*Cracticus*), Australian Magpie (*Gymnorhina tibicen*) and Magpie Lark (*Grallina cyanoleuca*) in Australia. Eggs dull white, blotched reddish or brown, 48 x 32 mm, 41 x 29 mm, similar to those of *Strepera graculina*; lays 1-5 eggs/nest (2+ in 52% of parasitized nests), often removes, cracks or dents host egg when laying; incubation period unknown. Hatchling naked, skin bronze, mouth pinkish red; unknown if eviction practised, host's chicks usually disappear from nest, cuckoo may outgrow and crowd out host's young; more than one cuckoo may fledge from a nest, sometimes young crows fledge also; fledges in 17-24 days. Fledgling's begging calls like those of host, but louder and more raucous. A captured crow-reared fledgling remained with its human "fosterer" for 30 days, flying free and returning to be fed.

Movements. Migratory and seasonal in Australia, where appears first on N coast; passage migrant through Torres Strait. Occurs in Northern Territory Oct-Apr. Rare in Queensland in Sept-Apr, though numbers winter in N Cape York Peninsula and Torres Strait region. Occurs in New Guinea in all months, but is not known to breed there; these involve mainly non-breeding birds from Australia. Vagrant New Zealand and New Caledonia.

Status and Conservation. Not globally threatened. Uncommon in much of its range in Australia, and scarce in Northern Territory. Abundant in New Britain in winter. Noisy and conspicuous in Dumoga Valley, N Sulawesi, Feb-Jun, but rare or absent at other times.

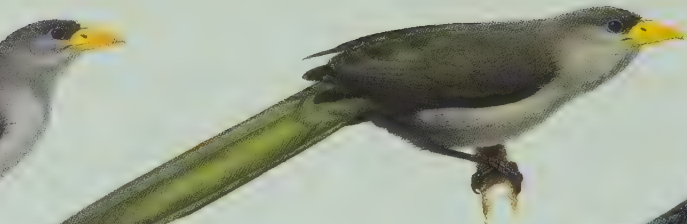
Bibliography. Barnes (1994), Beddard (1898), Beehler *et al.* (1986), Beruldsen (1980), Blakers *et al.* (1984), Brooker & Brooker (1989a), Coates (1985), Coates & Bishop (1997), Frauca (1967), Gilliard & LeCroy (1967a), Goddard & Marchant (1983), Hall (1974), Hansen (1976), Johnson (1983), Larkins (1994a, 1994b), McAllan (1995), Noske (1994), Ottow & Verheijen (1969), Rand & Gilliard (1967), Rose (1997a), Rozendaal & Dekker (1989), Rutgers & Norris (1972), Salter (1978), Schönwetter (1967), Storr (1977, 1980, 1984b), Strahan (1994), Stresemann (1940), Watling (1983), White & Bruce (1986), Wood & Wood (1991).

ssp aereus



51

ssp australis

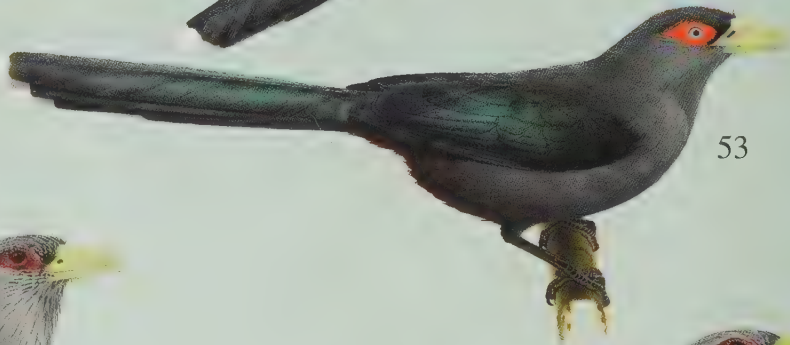


52

ssp flavirostris



53



ssp tristis

54



ssp elongatus



55

ssp leschenaultii



ssp sirkee

56



58



57

♂



♀

PLATE 63

inches 5
cm 12

Subfamily PHAENICOPHAEINAE

Tribe PHAENICOPHAEINI

Genus *CEUTHMOCHARES*

Cabanis & Heine, 1863

51. Yellowbill

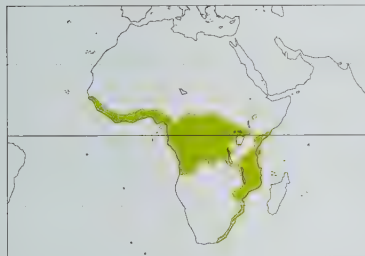
Ceuthmochares aereus

French: Malcoha à bec jaune **German:** Erzkuckuck **Spanish:** Malcoha Africano
Other common names: Green Malkoha/Coucal

Taxonomy. *Cuculus aereus* Vieillot, 1817, Malembo, Cabinda (Angola). Three subspecies recognized.

Subspecies and Distribution.

C. a. flavirostris (Swainson, 1837) - Gambia to Nigeria, W of R Niger.
C. a. aereus (Vieillot, 1817) - Nigeria and Bioko (Fernando Póo) to S Sudan and W Kenya, and S through Zaire to Angola and N Zambia.
C. a. australis Sharpe, 1873 - lowlands from Ethiopia and Kenya to Tanzania (including coastal islands), Malawi, Mozambique and coastal E South Africa.



Descriptive notes. 33 cm; 66 g. Adult of race *australis* green-glossed grey above, grey washed olive-buff below; bare skin around eye green to blue, iris red or brown, bill yellow (base of culmen black), feet black, soles white. Juvenile darker, less glossy, head grey, more grey below, iris brown, bill dark. Race *aereus* smaller, crown and nape dark grey, upperparts glossed blue, grey below; *flavirostris* glossed violet above. **Voice.** Song consists of a series of high notes descending in pitch and staccato, or increasing in tempo and run into a trill, first a series of squeaks, "tsik-tsik", then loud "teew, teew", with whinnying "wipwipwip" at end; call a mournful "kou-lee, kou-lee" like a curlew (*Numenius*); also a squirrel-like scolding "tsik-tsik".

Habitat. Forest, upper canopy of old secondary evergreen forest and riverine forest, and forest edge, where active 8-30 m above ground, in tall dense thickets, tangled creepers and lianas; in thorn bush along Omo R in Ethiopia, in uncharacteristically arid habitat. Lowlands, not a bird of montane forests, though occurs to 2000 m in E Africa; in S Africa mainly in coastal scrub.

Food and Feeding. Insects, including caterpillars, beetles, grasshoppers, crickets, leaf-hoppers, bees, spiders; tree frogs, slugs, fruit, seeds, leaves. Moves by short hops, balances with its long tail, searches through tangled creepers, turning and seizing an insect; sometimes accompanies mixed-species flocks of birds or squirrels, using them as beaters to flush insects, which it then seizes. Occurs singly, in pairs or in small groups of 3-5.

Breeding. Laying dates Mar and May in Ghana, Oct-Dec and Feb in Sierra Leone, Jun and Aug in Nigeria, Jul in Uelle, Nov and Dec in S Africa. Nest an open mass of sticks, sometimes domed, usually unlined, 2-5 m above ground in dense vegetation. Eggs 2 (3), white to creamy, stained, sometimes chalky; 30 x 23 mm. Both parents feed young.

Movements. Resident, though observed seasonally Nov-Jun in forest islands in Gambia, and locally a nocturnal migrant along coast in Nigeria and Kenya.

Status and Conservation. Not globally threatened. Nowhere very common, but secretive behaviour of this forest and thicket cuckoo limits frequency of observations. Formerly common in charcoal forests of coastal Ghana; locally common near Oussouye in Parc National de Basse-Casamance in S Senegal; common in all kinds of forest in Sierra Leone. Population density in NE Gabon c. 15-20 pairs/km². Fairly common in South Africa.

Bibliography. Ash & Miskell (1983), Bannerman (1933, 1953), Bates (1930), Benson & Benson (1977), Benson *et al.* (1971), Britton (1980a), Brosset & Énard (1986), Brown & Britton (1980), Cave & Macdonald (1955), Chapin (1939), Cheke & Walsh (1996), Christy & Clarke (1994), Clancey (1964b), Colston & Curry-Lindahl (1986), Dowsett & Forbes-Watson (1993), Elgood *et al.* (1994), Fry *et al.* (1988), Ginn *et al.* (1989), Giraudeau *et al.* (1988), Gore (1990), Grimes (1987), Lewis & Pomeroy (1989), Lippens & Wille (1976), Mackworth-Praed & Grant (1957, 1962, 1970), Maclean (1993), Nikolaus (1987), Pakenham (1979), Pérez de Val (1996), Pinto (1983), Rowan (1983), Short *et al.* (1990), Snow (1978), van Someren (1949), Thomas (1991), Wachter *et al.* (1997), Zimmerman (1972), Zimmerman *et al.* (1996).

Genus *PHAENICOPHAEUS* Stephens, 1815

52. Black-bellied Malkoha

Phaenicophaeus diardi

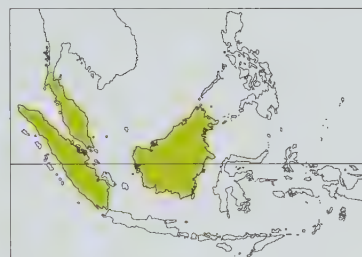
French: Malcoha de Diard **German:** Diardkuckuck **Spanish:** Malcoha Ventrinegro
Other common names: Lesser Green-billed/Black-billed Malkoha

Taxonomy. *Melias Diardi*, Lesson, 1830, Java; error = Sumatra.

Sometimes combined with *P. sumatranus*, *P. tristis* and *P. viridirostris* in a separate genus *Rhopodytes*. Two subspecies recognized.

Subspecies and Distribution.

P. d. diardi (Lesson, 1830) - S Myanmar (Tenasserim), S Thailand, Peninsular Malaysia and Sumatra.
P. d. borneensis (Salvadori, 1874) - Borneo.



Descriptive notes. 38 cm; 57 g. Adult long-tailed, grey above, wings blue-green; grey below, belly blackish grey, undertail tipped white; rugous red skin around eye, edge of eyelids black, iris bluish white, bill green with blue-grey base, feet dark grey. Juvenile similar, iris dark brown. Race *borneensis* smaller, more greenish (less grey) below. **Voice.** Sharp "pwew-pwew" call, also a soft "taup".

Habitat. Forests and second growth, swampy jungle, bamboo, typically occurring in dense undergrowth and creepers. Lowlands and foothills, to 1200 m.

Food and Feeding. Insects, including beetles,

ants, mantids, grasshoppers and caterpillars.

Breeding. Breeds Jan and Mar in Malaysia, Apr in Myanmar. Nest a shallow saucer of fine twigs, 18 cm in diameter, 3-4 cm deep, lined with green leaves, in a bush. Eggs 2-3, chalky white; 30 x 24-5 mm.

Movements. Resident.

Status and Conservation. Not globally threatened. Vulnerable to deforestation throughout its range, including Thailand, where species is still considered common. It appears to be rather uncommon in Malaysia, but perhaps more numerous in Sumatra. Although no breeding records are known for Borneo, it is resident and common there in lowlands.

Bibliography. Andrew (1992), Chasen (1939), Duckworth & Kelsh (1988), Ford & Davison (1995), Inskipp *et al.* (1996), Lekagul & Round (1991), MacKinnon & Phillips (1993), Madoc (1976), van Marle & Voous (1988), Medway & Wells (1976), Mees (1986), Meyer de Schauensee & Ripley (1940), Nash & Nash (1985), Robinson *et al.* (1924), Round (1988), Schönwetter (1967), Smythies (1981, 1986), Thompson (1966), Wilkinson, Dutton & Sheldon (1991).

53. Chestnut-bellied Malkoha

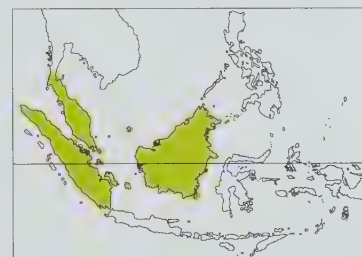
Phaenicophaeus sumatranus

French: Malcoha à ventre roux **German:** Rotbauchkuckuck **Spanish:** Malcoha Ventrirrufo
Other common names: Rufous-bellied Malkoha

Taxonomy. *Cuculus Sumatranus* Raffles, 1822, hills of Sumatra.

Sometimes combined with *P. diardi*, *P. tristis* and *P. viridirostris* in a separate genus *Rhopodytes*. Bornean population sometimes separated subspecifically as smaller *minor*, but overlaps with birds elsewhere in range. Monotypic.

Distribution. S Myanmar (S Tenasserim), S Thailand and Peninsular Malaysia to Sumatra and Borneo and several of their satellite islands.



Descriptive notes. 40-41 cm; 114 g. Adult dark metallic green above, head grey, wings metallic greenish blue, tail bluish grey; throat and breast grey, belly and undertail-coverts rufous-chestnut, undertail tipped white; rough red skin around eye, iris blue-grey, bill green, feet leaden to grey-green. Juvenile similar, but rectrices narrower, white tips shorter and narrower. **Voice.** "Tok-tok" or "chi-chi", also a thin high-pitched mew.

Habitat. Forest edge, second growth, mangroves, durian plantations, in dense crowns of trees. Lowlands to 1200 m.

Food and Feeding. Locusts, mantids, stick

insects, leaf insects, crickets, grasshoppers, large hairy caterpillars and occasionally frogs. Quiet, creeps through saplings and thickets.

Breeding. Breeding records in Jul in Borneo; copulation witnessed in late Aug, Sumatra. Nest comprises a flat platform of sticks, lined with leaves, situated in low shrub to high in tree. Eggs 2, white; 27-5 x 24 mm.

Movements. Resident.

Status and Conservation. Not globally threatened. Reported to be very common in S Tenasserim, but uncommon in neighbouring parts of S Thailand and only fairly common in Malaysia; in Singapore, likely to be seen only in the Water Catchment Forest. In Sumatra and Borneo, species seems to remain relatively common. Vulnerable to further deforestation throughout its range, although it does adapt to second growth and plantations.

Bibliography. Andrew (1992), Chasen (1931, 1939), Coomans de Ruiter (1947), Duckworth & Kelsh (1988), Ford & Davison (1995), Gibson-Hill (1949), Hails & Jarvis (1987), Holmes (1996), Inskipp *et al.* (1996), Lekagul & Round (1991), MacKinnon & Phillips (1993), Madoc (1976), van Marle & Voous (1988), Medway & Wells (1976), Mees (1986), Meyer de Schauensee (1940), Nash & Nash (1988), Round (1988), Smythies (1981, 1986), Wells (1990), Wilkinson, Dutton & Sheldon (1991).

54. Green-billed Malkoha

Phaenicophaeus tristis

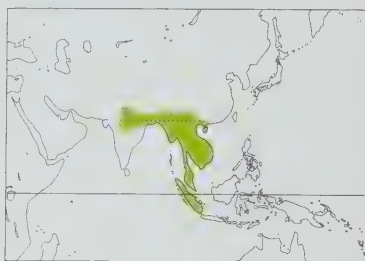
French: Malcoha sombre **German:** Großer Grünschnabelkuckuck **Spanish:** Malcoha Sombrio
Other common names: Greater Green-billed/Large Green-billed Malkoha

Taxonomy. *Melias tristis* Lesson, 1830, Sumatra; error = Bengal.

Sometimes combined with *P. diardi*, *P. sumatranus* and *P. viridirostris* in a separate genus *Rhopodytes*. Six subspecies recognized.

Subspecies and Distribution.

P. t. tristis (Lesson, 1830) - N India from outer Himalayas (to 1800 m) and Kumaon S to Madhya Pradesh, E through Nepal, Sikkim and Bhutan to Assam and Bangladesh.
P. t. saliens (Mayr, 1938) - N Myanmar, N Thailand, N Indochina and S China (Yunnan).
P. t. hainanus (Hartert, 1910) - Hainan.
P. t. longicaudatus Blyth, 1842 - S Myanmar, S Thailand and S Indochina to Malaysia.
P. t. elongatus S. Müller, 1835 - Sumatra.
P. t. kangeangensis (Vorderman, 1893) - Kangean Is.



Descriptive notes. 50 cm; 115 g. Adult *tristis* dark grey with green gloss above, oily green wings and tail, tail very long with broad white tips; lower belly grey to blackish; bare red skin around eye, iris brown (or inner ring claret, outer ring white), bill pale green, feet greenish grey. Juvenile shorter-tailed. Race *saliens* shorter-winged, longer-tailed; *longicaudatus* long-winged, long-tailed; *hainanus* shorter-winged than *saliens*, shorter white tail spots; *elongatus* darker green-grey, long white tail spots; *kangeangensis* paler grey, long white tail spots. **VOICE.** A clucking and croaking frog-like call, "ko, ko, ko, ko", sometimes ending

with a run, "co-co-co-co"; cat-like chuckle when flushed.

Habitat. Primary forest, second growth, dense thickets, scrub, cultivated areas, rubber plantations, hill forest, bamboo. Lowlands to hills at c. 1600 m, locally to 1800 m; mostly below 700 m in Nepal.

Food and Feeding. Insects, large caterpillars, Orthoptera, also lizards. Feeds in dense foliage in thickets and trees.

Breeding. Breeds Apr-Aug in India, May in Nepal, Mar-Sept in Myanmar, Jan-Mar in Peninsular Malaysia; young bird being fed by parents in early May, Sumatra. Nest a small platform of twigs, lined with green leaves, in middle of small tree (in Thailand, closed nest high in tree reported seen with naked eye only). Eggs 3 (2-4) in India, 2-3 in Myanmar, 2 in Thailand and Peninsular Malaysia, chalky white; 34 x 26 mm. Both sexes incubate.

Movements. Resident.

Status and Conservation. Not globally threatened. Common or very common resident throughout much of its expansive range. Said to be fairly common in Nepal up to 700 m, but uncommon at higher elevations; rare in Hainan. Adaptability to a number of man-modified habitats suggest species is probably not immediately at risk.

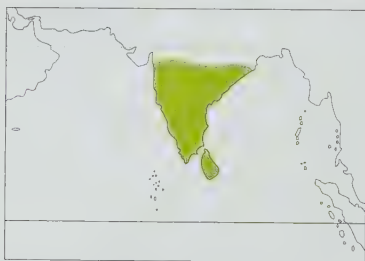
Bibliography. Abdulali (1971), Ali (1996), Ali & Ripley (1981), Ali *et al.* (1996), Biswas (1960), Chasen (1939), Deignan (1945), Échécopar & Hüe (1978), Harvey (1990), Holmes (1996), Inskipp & Inskipp (1991), Junge & Kooiman (1951), Lekagul & Round (1991), MacKinnon & Philipps (1993), Madoc (1976), Majumdar *et al.* (1992), van Marle & Voous (1988), Medway & Wells (1976), Ripley (1982), Robinson & Kloss (1931), Smythies (1986), Stepanyan (1995), Thewlis *et al.* (1996), Yang Lan *et al.* (1995).

55. Blue-faced Malkoha*Phaenicophaeus viridirostris*

French: Malcoha à bec vert **German:** Kleiner Grünschnabelkuckuck **Spanish:** Malcoha Cariatul
Other common names: Lesser Green-billed/Small Green-billed Malkoha

Taxonomy. *Zanclostomus viridirostris* Jerdon, 1840, bottom of the Coonoor Pass, India. Sometimes combined with *P. diardi*, *P. sumatranus* and *P. tristis* in a separate genus *Rhopodytes*. Monotypic.

Distribution. Peninsular India from about NW Maharashtra and C Orissa S to Sri Lanka.



Descriptive notes. 39 cm; 77 g. Adult greenish grey above, head slate-grey, wings glossy blue-green, tail long, graduated, black with white tips; throat and breast dark grey with light grey hackles forked at tip (appear wet), belly grey and buff, undertail-coverts dark grey; colourful bare pale blue skin around eye, iris with narrow white outer ring, dark red inner ring, bill pale green, feet slaty-blue. Juvenile less green-glossed above, paler below; outer primary softer and broader than in adult (where sickle-shaped), tail feathers narrower, central pair with narrow pale tip. Flight slow, direct, laboured, on short, rounded wings.

VOICE. Call a low croak, "kraa".

Habitat. Secondary woodland, thorn scrub and bush, especially with *Euphorbia antiquorum*. Low country to hills at 1000 m.

Food and Feeding. Insects, caterpillars, grasshoppers, mantids, cicadas, beetles; also lizards, fruit. Spends time in branches and thickets, peering at leaves for insects; usually singly or in pairs.

Breeding. Breeds nearly all year, mainly Mar-May in S India. Nest a bulky saucer of twigs lined with green leaves, near ground to 1-2 m above. Eggs 2 (3), chalky white; 29 x 25 mm. Hatchling with blackish skin, white hair-like down.

Movements. Resident.

Status and Conservation. Not globally threatened. Widespread though not abundant throughout most of its range, in a habitat that is not immediately at risk; common in dry zone of low country in Sri Lanka, e.g. in Uda Walawe, Bundala and Yala National Parks.

Bibliography. Abdulali (1971), Ali (1996), Ali & Ripley (1981), Ali & Whistler (1937), Chakravarthy & Purna Chandra Tejasvi (1992), Henry (1971), Inskipp *et al.* (1996), Kotagama & Fernando (1994), Legge (1880), Philipps (1978), Ripley (1982), Saha & Dasgupta (1992), Wait (1925), Wheatley (1996), Wijesinghe (1994).

56. Sirkeer Malkoha*Phaenicophaeus leschenaultii*

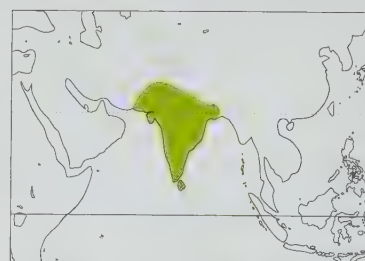
French: Malcoha sirkir **German:** Sirkarkuckuck **Spanish:** Malcoha Sirkir
Other common names: Sirkeer (Cuckoo), Southern Sirkeer

Taxonomy. *Taccocua leschenaultii* Lesson, 1830, Madras.

Sometimes retained in the monotypic genus *Taccocua*, in which it was originally named. Three subspecies recognized.

Subspecies and Distribution.

P. l. sirkee (J. E. Gray, 1831) - Pakistan (Sind, Punjab) and NW India.
P. l. infuscata (Blyth, 1845) - India in sub-Himalayan *terai* and *duars* from Kumaon through Nepal to W Assam and Bangladesh, and S to SC Maharashtra and N Andhra Pradesh.
P. l. leschenaultii (Lesson, 1830) - S India and Sri Lanka.



Descriptive notes. 43 cm; 174 g. Adult sandy-rufous above with black shaft streaks to head and breast, long tail blackish brown with broad white tips on outer feathers, inner rectrices unmarked sandy-rufous; throat and breast light brown, belly sandy-rufous; feathered around eye with narrow blue orbital skin, iris red to brown, bill red with yellow tip, feet dark grey. Juvenile, above feathers edged pale rufous, below streaked with black. Race *infuscata* paler, *sirkee* palest. **VOICE.** Silent; occasional shriek, "kek-kek-kek-kerek-kerek".

Habitat. Dry deciduous secondary forest, scrub and bush, with undergrowth of lantana

and thick grass, thorn and grass jungle, dry stony hillsides. Plains and foothills to 1000 m, in Nepal mainly to c. 360 m.

Food and Feeding. Large insects, grasshoppers, mantids, caterpillars, termites, also lizards, berries, fruits. Terrestrial, feeds mainly on ground, often runs; occasionally flies from one tree to another.

Breeding. Breeds mainly Jun-Sept in India, Jun-Jul in Sri Lanka. Nest a saucer of twigs lined with green leaves, near ground. Eggs 2-3, chalky white; 36 x 26 mm. Both sexes incubate.

Movements. Resident.

Status and Conservation. Not globally threatened. Generally a rather rare species; uncommon in S India. Its range extends from lowlands to foothills, to the level where tea and rubber plantations have replaced the previous vegetation of scrub and forest. In first half of 20th century, it expanded its range into drier areas of Sind, Pakistan, along irrigation canals. Uncommon and local in dry zone of low country in Sri Lanka, but frequent in parts of Uda Walawe National Park.

Bibliography. Ali (1996), Ali & Ripley (1981), Ali & Whistler (1937), Biswas (1960), Harvey (1990), Henry (1971), Inskipp, C. (1989), Inskipp, C. & Inskipp (1991), Inskipp, T. *et al.* (1996), Kotagama & Fernando (1994), Legge (1880), Mahabal & Lamba (1987), Majumdar *et al.* (1992), Mukherjee (1995), Philipps (1978), Ripley (1982), Roberts (1991), Wheatley (1996), Wijesinghe (1994), Zacharias & Gaston (1993).

57. Raffles's Malkoha*Phaenicophaeus chlorophaeus*

French: Malcoha de Raffles **German:** Bubukuckuck **Spanish:** Malcoha de Raffles

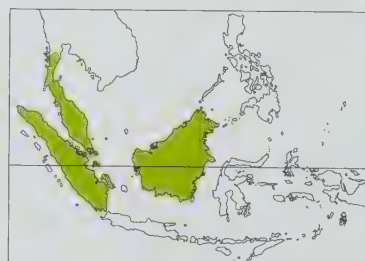
Taxonomy. *Cuculus chlorophaeus* Raffles, 1822, forests of Sumatra.

Sometimes placed in a monotypic genus *Rhinorhina*, the only malkoha to show marked sexual dimorphism. Two subspecies recognized.

Subspecies and Distribution.

P. c. chlorophaeus (Raffles, 1822) - S Myanmar (Tenasserim), S Thailand and Peninsular Malaysia to Sumatra and N, E & S Borneo.

P. c. fuscicularis (Stuart Baker, 1919) - NW Borneo (Sarawak, NW Kalimantan).



Descriptive notes. 32 cm; 52.5 g. Adult male rufous above, head rufous, tail black, finely barred grey and broadly tipped white; rufous throat and breast, dark grey belly, grey vent; bare skin around eye light blue-green, iris dark brown, bill light green, feet green-grey. Female with head and mantle light grey, back, wings and tail rufous, tail with subterminal black band and white tip, grey underparts, chestnut vent, iris yellow to dark brown. Juvenile resembles adult. Race *fuscicularis* smaller, female washed buffish. **VOICE.** A soft mournful "miaow", 3-6 notes on descending scale; also harsh croaks and a chirp.

Habitat. Primary forest, also second growth, forest edge, heath scrub, overgrown plantations, locally gardens. Lowlands to 900 m.

Food and Feeding. Mostly insects, mainly caterpillars, also butterflies, cicadas, crickets, beetles, locusts. Creeps through dense vegetation, searches for caterpillars on leaves of trees; feeds in middle storey, among creepers on tree trunks, peers under leaves for large insects; moves about looking like a squirrel.

Breeding. Breeds Jan and May in Peninsular Malaysia; oviduct egg Jan in Borneo. Nest undescribed. Eggs 2-3, white; 33 x 25 mm.

Movements. Resident.

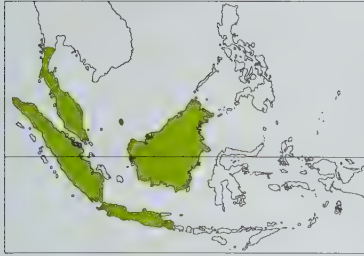
Status and Conservation. Not globally threatened. A common species throughout most of its sizeable range. Frequent observation in degraded, secondary and man-modified habitats suggests species may be relatively adaptable in face of the major habitat destruction affecting vast portions of its range.

Bibliography. Andrew (1992), Chasen (1939), Ford & Davison (1995), Gibson-Hill (1949), Inskipp *et al.* (1996), Lekagul & Round (1991), MacKinnon & Philipps (1993), Madoc (1976), van Marle & Voous (1988), Mayr (1938), Medway & Wells (1976), Mees (1986), Meyer de Schauensee & Ripley (1940), Nash, A.D. & Nash (1985), Nash, S.V. & Nash (1988), Ripley (1942), Robinson *et al.* (1924), Schönwetter (1967), Smythies (1981, 1986), Wilkinson, Dutson & Sheldon (1991).

58. Red-billed Malkoha*Phaenicophaeus javanicus*

French: Malcoha javanais **German:** Kastanienbauchkuckuck **Spanish:** Malcoha Piquirrojo

Taxonomy. *Phaenicophaeus* [sic] *Javanicus* Horsfield, 1821, Java. Sometimes placed in monospecific genus *Zanclostomus*. Monotypic.



1000 m, occasionally to 1500 m.

Distribution. S Myanmar (Tenasserim) and S Thailand through Peninsular Malaysia to Sumatra, Natuna Is, Borneo and Java.

Descriptive notes. 42 cm; 98 g. Adult grey above, glossed bluish green on back and wings, tail tipped white; rufous below with grey lower-breast bar; bare skin around eye grey or blue, iris brown, bill red with blackish culmen, legs slaty. Juvenile similar, but rectrices narrow, white tip of tail shorter (central feathers: 8 mm in juvenile, 18 mm in adult). **VOICE.** A striking whining call, a quiet and deep "kuk".

Habitat. High trees in drier forest, forest edge, secondary scrub. Lowlands and hilly areas to

Food and Feeding. Large insects, cicadas, stick insects (phasmids), grasshoppers (Acrididae, Tettigoniidae), mantids, beetles (Scarabaeidae), bugs, winged termites, caterpillars (Sphingidae), pupae (Pieridae); also spiders and crustaceans.

Breeding. Breeds Jun in Peninsular Malaysia, Apr in Kalimantan. Monogamous, lives in pairs. Nest a flimsy platform of twigs. Eggs chalky white; 29 x 23 mm.

Movements. Resident.

Status and Conservation. Not globally threatened. The least common malkoha species in Borneo, where it has, however, shown itself capable of adapting to cocoa plantations; also rather infrequent in Sumatra and Java. Rare in Myanmar and uncommon in Peninsular Malaysia, but reported to be common in intervening area in Thailand.

Bibliography. Andrew (1992), Chasen (1939), Duckworth & Kelsh (1988), Ford & Davison (1995), Gibson-Hill (1949), Hellebrekers & Hoogerwerf (1967), Holmes (1996), Holmes & Burton (1987), Inskipp *et al.* (1996), Lekagul & Round (1991), MacKinnon (1988), MacKinnon & Phillipps (1993), van Marle & Voous (1988), Medway & Wells (1976), Nash & Nash (1988), Schönwetter (1967), Smythies (1981, 1986), Sody (1989), Thompson (1966), Wilkinson, Dutson & Sheldon (1991).

inches 6
cm 15

ssp calyborhynchus

ssp rufiloris

59

ssp curvirostris

60

ssp harringtoni

ssp oeneicaudus

61

62

ssp cagayanensis

ssp superciliosus

63

64

65

66



59. Yellow-billed Malkoha

Phaenicophaeus calyrorhynchus

French: Malcoha à bec peint **German:** Buntschnabelkuckuck **Spanish:** Malcoha de Célebes
Other common names: Fiery-billed/Celebes Malkoha

Taxonomy. *Phaenicophaeus calyrorhynchus* Temminck, 1825, Sulawesi.
Forms a superspecies with *P. curvirostris*, the two sometimes placed in a separate genus *Rhamphococcyx*. Three subspecies recognized.
Subspecies and Distribution.
P. c. calyrorhynchus Temminck, 1825 - N, E & SE Sulawesi and Togian Is.
P. c. meridionalis (A. B. Meyer & Wigglesworth, 1896) - C & S Sulawesi.
P. c. rufiloris Hartert, 1903 - Butung.



Descriptive notes. 53 cm. Adult back rufous-maroon above, crown and face dark grey, wings dark purple, tail black; throat and breast rufous, belly dark grey; iris red; bill deep, curved, yellow above, tip black with white spot, below nostril and lower mandible red. Juvenile resembles adult, but iris brown, bill yellow. Race *calyrorhynchus* darker; *meridionalis* paler on crown and below; *rufiloris* has feathering above lores dark rufous, rather than grey. **VOICE.** Call a short winding-up rattle.
Habitat. Inhabits secondary forest and forest edge, also coconut plantations, riverine vegetation near villages. Occurs from sea-level up

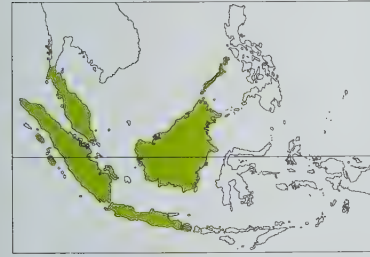
to 1300 m.
Food and Feeding. Insects, including hairy caterpillars, locusts and mantids, and beetles. Hops and creeps around the canopy like a squirrel; follows macaque monkey groups and catches insects flushed by the monkeys; also follows *Centropus celebensis*.
Breeding. Breeds Nov-Dec. Nest undescribed. Eggs white; 36 x 31 mm; clutch size not recorded. Although apparently a nesting species, a juvenile was fed by a Crimson Sunbird (*Aethopyga siparaja*) in Sulawesi.
Movements. Resident.
Status and Conservation. Not globally threatened. Very little known about status, but occurrence at forest edge, in coconut groves and relatively near human habitation may suggest certain adaptability; biology also poorly known, research required. Common in suitable habitat in Dumoga-Bone National Park in mid-1980's.
Bibliography. Andrew (1992), Coates & Bishop (1997), Fooden (1969), Fraser & Henson (1996), Holmes & Phillips (1996), Inskipp *et al.* (1996), Jepson (1997), Rozendaal & Dekker (1989), Schönwetter (1967), Stresemann (1940), Watling (1983), Wheatley (1996), White & Bruce (1986), Whitten, Mustafa & Henderson (1987).

60. Chestnut-breasted Malkoha

Phaenicophaeus curvirostris

French: Malcoha rouverdin **German:** Schimmerkuckuck **Spanish:** Malcoha Pechicastaño
Other common names: Palawan Malkoha (*harringtoni*)

Taxonomy. *Cuculus curvirostris* Shaw, 1810, western Java.
Forms a superspecies with *P. calyrorhynchus*, the two sometimes placed in a separate genus *Rhamphococcyx*. Populations of Sumatra have on occasion been listed as race *erythrognathus*. Six subspecies recognized.
Subspecies and Distribution.
P. c. singularis (Parrot, 1907) - S Myanmar (Tenasserim) and S Thailand through Peninsular Malaysia to Sumatra.
P. c. oeneicaudus J. & E. Verreaux, 1855 - Mentawai Is (off W Sumatra).
P. c. curvirostris (Shaw, 1810) - W & C Java.
P. c. deningeri Stresemann, 1913 - E Java and Bali.
P. c. microrhinus Berlepsch, 1895 - Borneo and Bangka.
P. c. harringtoni (Sharpe, 1877) - SW Philippines (Balabac, Palawan, Calamianes).



Descriptive notes. 42-49 cm; 122 g. Adult dark glossy green above (blue in worn plumage), head grey, narrow white supercilium, tail broadly tipped vinaceous (no white); dark vinaceous below; rough bare skin around eye red, iris white to yellow to red; bill curved, light green to yellow to horn above, red to black below, feet dark grey. Juvenile more feathered on face, tail feathers narrower, bill yellow with mostly black lower mandible. Race *curvirostris* as above, nostril oval with long anterior groove in adult; *deningeri* paler, lower face light grey, throat light rufous; *singularis* has cheeks and chin grey, belly black, bill green with red below nostril and on lower mandible; *microrhinus* with head dark grey (chin rufous on some), dark reddish brown below, bill green with red below nostril and on lower mandible, nostril ungrooved; *oeneicaudus* generally darker with greenish flanks, central rectrices all green (outer rectrices with rufous tip); *harringtoni* often paler below, with head grey washed olive brown, narrow grey strip below eye, bill yellow to green with red below, nostril vertical, ungrooved. **VOICE.** A low "kuk-kuk", ticking or knocking calls like a clucking chicken, and a fast "kok-kok-kok" in flight.
Habitat. Thickets in primary forest, forest edge, second growth, creepers, vines, plantations, gardens, mangroves. On both mainland and islands from lowlands up to 1100 m.

Food and Feeding. Insects, including caterpillars (hairy and hairless) (Lasiocampidae), grasshoppers (Acrididae), crickets, beetles, cockroaches, stick insects, locusts; also small crabs, nestling birds, lizards, frogs, rats. Perches motionless in tree canopy, for several minutes, watching for prey; also moves around, hops and swings tail like a squirrel.

Breeding. Breeds Jan-Mar in Malaysia (eggs), Jan in Sumatra (eggs), Apr, Jul and Nov in Java (nestlings, recently fledged young). Nest a thick platform of dead twigs, lined with leaves, in fork of tree. Eggs 2-3, chalky white, stained by dirt; 39 x 28 mm.
Movements. Resident.
Status and Conservation. Not globally threatened. A common species in lowlands of S Thailand, Borneo and Philippines, and fairly common to common in Peninsular Malaysia, Sumatra, Java and Bali; in NW of range, locally even very common, in S Myanmar. Extensive use of secondary and marginal habitats suggests species relatively secure.
Bibliography. Andrew (1992), Büttikofer (1901), Chasen (1939), Deignan (1952), Dickinson *et al.* (1991), Duckworth & Kelsh (1988), Ford & Davison (1995), Hellebrekers & Hoogerwerf (1967), Lekagul & Round (1991), MacKinnon (1988), MacKinnon & Phillips (1993), Madoc (1976), van Marie & Voous (1988), Medway & Wells (1976), Mees (1986, 1996), Robinson *et al.* (1924), Smythies (1981, 1986), Sody (1989), Stresemann (1913a), Thompson (1966), Wilkinson, Dutton & Sheldon (1991).

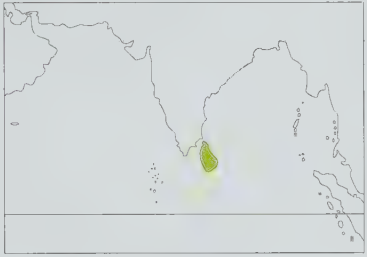
61. Red-faced Malkoha

Phaenicophaeus pyrrhocephalus

French: Malcoha à face rouge **German:** Nackstirnckuckuck **Spanish:** Malcoha Carirrojo

Taxonomy. *Cuculus pyrrhocephalus* Pennant, 1769, Sri Lanka.
Monotypic.

Distribution. Sri Lanka.



Descriptive notes. 45-47 cm. Adult black above, glossed green and blue, crown and neck finely streaked white, tail black with broad white tips; chin and lower face whitish, throat and breast black, belly white; very prominent bare rugous red skin on face, iris brown in male, white in female; bill stout, curved, light yellowish green; feet slaty grey. Juvenile shorter-tailed, smaller red face patch, breast with white streaks. **VOICE.** Mostly silent; sometimes short single yelping whistles, also a "kok", and a low whining "kra".
Habitat. Dense forest in wet zone, also riverine forest in dry zone of N & E Sri Lanka, disap-

pearing in cultivated areas. Lowlands to 1700 m.
Food and Feeding. Fruits and berries of forest trees. Hops from branch to branch, flutters and sails from tree to tree. Usually forages in mixed feeding flocks, characteristically led by Orange-billed Babblers (*Turdoides rufescens*) and containing mostly medium-sized birds; normally 2-4 malkohas in a flock, although up to 6 have been recorded.
Breeding. Breeds Jan-May; also gonads enlarged to Aug-Sept. Nest a shallow saucer near ground, in dense undergrowth. Eggs 2-3, chalky white; 36 x 27 mm.
Movements. Resident.
Status and Conservation. **VULNERABLE.** Although not uncommon locally, this species is generally scarce and is mostly restricted to fragmented small local populations in wet zone of SW Sri Lanka. Its numbers have declined through shooting and through loss of habitat to cultivation. All specimen records are from Sri Lanka; several old, unconfirmed sight records have come from S India, in S Kerala and W Tamil Nadu, but these are now considered more likely to be misidentifications.
Bibliography. Ali & Ripley (1981), Biddulph (1956), Collar & Andrew (1988), Collar *et al.* (1994), Henry (1971), Hoffmann (1984, 1989a), Inskipp *et al.* (1996), Kotagama & Fernando (1994), Legge (1880), Phillips (1978), Ripley (1982), Tirimanna (1981), Wheatley (1996), Wijesinghe (1994).

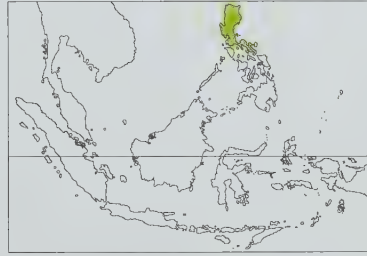
62. Rough-crested Malkoha

Phaenicophaeus superciliosus

French: Malcoha à sourcils rouges **German:** Rotbrauenkuckuck **Spanish:** Malcoha Crestirrojo
Other common names: Red-crested Cuckoo

Taxonomy. *Phaenicophaeus* [sic] *superciliosus* Dumont, 1823, Philippines.
Sometimes placed in monotypic genus *Dasylophus*. Two subspecies recognized.

Subspecies and Distribution.
P. s. cagayanensis Rand & Rabor, 1967 - Cagayan Province, NE Luzon.
P. s. superciliosus Dumont, 1823 - Luzon (W & S of range of previous race).



Descriptive notes. 38 cm; male 115 g, female 120 g. Adult all glossy black, short red eye-brow crest, white tips to tail, bare skin around eye red to yellowish orange, iris yellow, bill pale green with orange base, legs and feet greenish at front, yellow behind. Juvenile all black or with brown forehead, no red crest at fledging (crest develops shortly afterwards, replaces brown forehead), shorter white tips to tail, bill brown to green. Race *cagayanensis* has crest shorter, the components of both sides meeting and merging on forehead, breast paler. **VOICE.** Short, ascending metallic whistles.
Habitat. Forests, also grassland with bushes;

recorded at altitudes of 100-800 m.
Food and Feeding. Large insects (katydids, beetles), also worms, lizards. Creeps and hops in tangles of vines, drops to ground to grab insects that fall from branches as it disturbs them.
Breeding. Breeds May-Jun. Nest undescribed. Young fledge by time they reach 60 g.
Movements. Resident.
Status and Conservation. Not globally threatened. Appears to be fairly common in forests, but these are being heavily depleted throughout the species' range. Present in degraded forest of Angat Watershed, N of Manila, where forest remains because it protects the catchment area of this impor-

tant water supply for Manila; also present in Quezon National Park, C Luzon, but habitat under immediate threat at this site, where deforestation is going on despite protected status. Populations should be monitored, in order to establish current status of species.

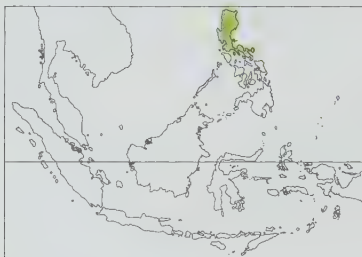
Bibliography. Danielsen *et al.* (1994), Delacour & Mayr (1946), Dickinson *et al.* (1991), DuPont (1971), Gonzales (1983), Goodman & Gonzales (1990), Inskipp *et al.* (1996), McGregor (1909-1910), Ogilvie-Grant (1895), Poulsen (1995).

63. Scale-feathered Malkoha

Phaenicophaeus cumingi

French: Malcoha fris  **German:** Schuppenhalskuckuck **Spanish:** Malcoha Frisado
Other common names: Scale-feathered/Scaly Cuckoo

Taxonomy. *Phoenicophaeus* [sic] *Cumingi* Fraser, 1839, Luzon. Sometimes placed in monotypic genus *Lepidogrammus*. Monotypic.
Distribution. Luzon, Marinduque and Catanduanes (N Philippines).



Descriptive notes. 42 cm; male 177 g, female 170 g. Adult dark brown above, head grey, forehead and throat whitish (head and throat with flat, scaly glossy blue-black feathers), wings and rump glossy dark green to blue, tail blacker with white tip; breast chestnut, belly dull black; bare skin around eye red, iris red, bill pale creamy-buff to brown, feet grey. Juvenile with most of head, wings and body dark reddish brown, neck rufous; scaly head feathers grow while bird still short-tailed. Voice. Metallic and higher-pitched compared with voice of *P. superciliosus*.

Habitat. Forest. Lowlands to 2000 m.

Food and Feeding. Insects, centipedes, worms, and small lizards. Forages mainly in lower layers of forest, climbs to 12 m in vines.

Breeding. Little information. Presumably breeds Mar-May (estimated from juveniles). Nest undescribed.

Movements. Resident.

Status and Conservation. Not globally threatened. Seems to be fairly common, but the continued destruction of its forest habitat must surely present a major threat; apparently somewhat less frequent than *P. superciliosus*. Present in degraded forest of Angat Watershed, N of Manila, where forest remains because it protects the catchment area of this important water supply for Manila; also present in Quezon National Park, C Luzon, but habitat under immediate threat at this site, where deforestation is going on despite protected status. Populations require monitoring.

Bibliography. Alonzo-Pasicolan (1992), Danielsen *et al.* (1994), Delacour & Mayr (1946), Dickinson *et al.* (1991), DuPont (1971), Gilliard (1950b), Gonzales (1983), Gonzales & Rees (1988), Goodman & Gonzales (1990), Hachisuka (1934), Inskipp *et al.* (1996), Manuel (1937), McGregor (1909-1910).

Genus CARPOCOCYX G. R. Gray, 1840

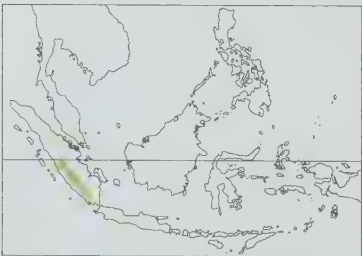
64. Sumatran Ground-cuckoo

Carpococcyx viridis

French: Calobate de Sumatra **German:** Sumatrakuckuck **Spanish:** Cuco Terrestre de Sumatra
Other common names: Sunda/Green-billed/Malay Ground-cuckoo (with *C. radiatus*)

Taxonomy. *Carpococcyx viridis* Salvadori, 1879, Mount Singgalang, Sumatra. Usually treated as conspecific with *C. radiatus*, but clearly smaller and shows distinct plumage differences from latter at all ages. Monotypic.

Distribution. SW Sumatra (foothills of Barisan Range).



Descriptive notes. 55 cm. Adult black on crown, shading to green on hindcrown; mantle, upper back, neck sides, wing-coverts and secondaries dull green, lower back brown with broad greenish brown bars, wings and tail glossy greenish black; lower throat and upper breast dull greyish green, rest of underparts cinnamon-buff, more rufous on flanks, finely barred brownish green on lower breast and brown on belly and flanks; bare skin above eye green, behind eye lilac and on cheek blue, iris dull reddish, bill green, paler below, tarsi green. Lacks dark-hooded appearance and purplish or coppery hues on upperparts of *C.*

radiatus. Juvenile rufous-chestnut above with indistinct brown barring, wings and tail variable greenish rufous, chin to breast mottled brownish, shading to rufous-buff on belly, belly and vent faintly barred, smaller area of bare skin around eye than in adult, iris dark grey, bill horn-black, feet dark grey. Voice. Unknown.

Habitat. Forest in hilly areas, where lives on the ground. Between 300 and 1400 m.

Food and Feeding. Insects.

Breeding. Unknown.

Movements. Resident.

Status and Conservation. **VULNERABLE.** True status of species has until recently been concealed by the fact that it was treated as conspecific with Bornean *C. radiatus*. Present species is in fact seriously in danger, and might even be extinct. Known only from 8 museum specimens, all from areas in which the Sumatran rhinoceros (*Dicerorhinus sumatrensis*) was also known. It has not been observed in the wild since 1916, but ground-cuckoos are unobtrusive and it may possibly still persist in some forest areas. At least a third of the montane forest and most lowland forest on Sumatra has been lost, however, and the continuing headlong destruction of this habitat is likely to

be the most serious threat to the survival of this species. Field research is required to determine the location and extent of any remaining populations.

Bibliography. Andrew (1992), Arbocco *et al.* (1978), Collar & Andrew (1988), Collar & Long (1996), Collar *et al.* (1994), Finsch (1898), Holmes (1996), Inskipp *et al.* (1996), Jepson (1997), MacKinnon & Philipps (1993), van Marle & Voous (1988), Robinson & Kloss (1918, 1923), Robinson *et al.* (1924), Wheatley (1996).

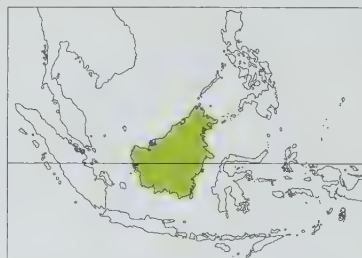
65. Bornean Ground-cuckoo

Carpococcyx radiatus

French: Calobate de Borneo **German:** Laufkuckuck **Spanish:** Cuco Terrestre de Borneo
Other common names: Sunda/Green-billed/Malay Ground-cuckoo (with *C. radiatus*), Radiated Fruit-cuckoo

Taxonomy. *Calobates radiatus* Temminck, 1832, Pontianak district, western Borneo. Usually treated as conspecific with *C. viridis*, but clearly larger and shows distinct plumage differences from latter at all ages. Often referred to as *C. radiceus*, but this name resulted from an error in the original description, subsequently (1838) emended by Temminck himself to *C. radiatus*. Monotypic.

Distribution. Borneo.



Descriptive notes. 60 cm. Adult with head purple-glossed black, neck sides grey, mantle and back dull green with purple gloss with coppery-red reflections, lower back and rump rufous with faint dark bars, wings and tail unbarred coppery-violet; chin and throat black, rest of underparts barred white and black; bare skin around eye green, iris brown or grey, bill green, tarsi green. Juvenile like adult, but crown greenish brown, and unbarred uniform pale rufous below, some with grey throat. Voice. A cough, "heh heh heh"; loud 2-note call, "tock-tor", first note rising and second falling, dove-like or barbet-like in quality; also

loud 2-note "koohoo" like that of *Eudynamis scolopacea*.

Habitat. Forest, particularly lowland and hill forest in Brunei, primary forest on limestone soils in Sabah. Terrestrial, but nests and roosts in trees. At 300-1700 m.

Food and Feeding. Mainly insects, including beetles and giant ants; also takes fruit. Lives on the ground, where runs and jumps; sometimes follows army-ant swarms.

Breeding. Nest undescribed, in trees. Eggs white, 47 x 35 mm.

Movements. Resident.

Status and Conservation. **VULNERABLE.** Rare and patchy in distribution, though it is widespread throughout Borneo, albeit with very few recent records. Vulnerable to continuing degradation and loss of forest through human activity. Research required.

Bibliography. Andrew (1992), Beddard (1901), B tikofer (1901), Collar & Andrew (1988), Collar & Long (1996), Collar *et al.* (1994), Davison (1979), Finsch (1898, 1901), Holmes & Burton (1987), Inskipp *et al.* (1996), Jepson (1997), MacKinnon & Philipps (1993), Mayr (1938), Robinson *et al.* (1924), Sch n wetter (1967), Smythies (1981), Wheatley (1996).

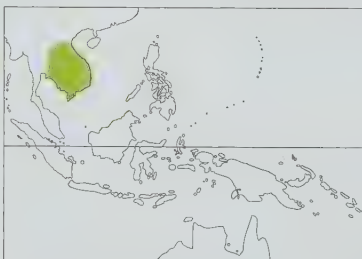
66. Coral-billed Ground-cuckoo

Carpococcyx renauldi

French: Calobate de l'Annam **German:** Renauldckuckuck **Spanish:** Cuco Terrestre de Indochina
Other common names: Renauld's Ground-cuckoo

Taxonomy. *Carpococcyx Renauldi* Oustalet, 1896, Province of Quang-tri, Annam. Monotypic.

Distribution. Thailand, Laos, Cambodia and Vietnam (absent from Tonkin).



Descriptive notes. 65 cm; 400 g (captive, 44 days after hatching, when nearly grown). Adult grey above, head, neck and throat black, rump unbarred dark grey to rufous, primaries and tail black, tail glossed violet; white below, lower breast and grey belly finely vermiculated blackish; bare skin around eye red and violet, iris dull orange to yellowish, bill dusky red, rectal area violaceous blue, feet red. Juvenile dark grey above, head brown with grey around eye, back barred rufous, rump brown, wing-coverts barred rufous, chin to upper breast grey to rufous-brown, iris light brown, bill and feet blackish brown. Voice. Low melancholy whistle, rolling whistle; also duet, with one bird giving 3-note "whup, whoo-up", the other a rolling gargle; male gives bill-clack as last sound of "coo-cuh-clack".

Habitat. Forests (lower and middle strata), second growth, scrub, dense cover on ground, rocky areas. Terrestrial, but nests and roosts in trees. Lowlands to 900 m.

Food and Feeding. Insects, small reptiles, small mammals, small birds; captives require a high-protein diet, maintained on pigeon grain, take newborn mice, adult mice, crickets, mealworms and earthworms. In natural habitat a shy ground-living species, runs from disturbances, but quick and agile, capable of strong rapid flight when disturbed from cover.

Breeding. Nest an open platform of leaves and branches, twigs of figs, lined with leaves, 36 cm wide and 8 cm deep, built by both sexes, in tree; in captivity, use an open basket placed 2m above ground. Eggs 2-4, laying interval 2-3 days, white; 44 x 34 mm; incubation by both sexes (in captivity) c. 28 days (18-19 days in incubator at 37-6 C and 60-70% humidity). Nestling skin brown, brownish black down on wings and body, feather sheaths dark grey, palate red with white markings, palate colours faded by independence; fed by both parents, fledging 18 days, feeds self from 28 days; independent at 50-60 days, when may be driven off by adult male when the parents nest again.

Movements. Resident.

Status and Conservation. Not globally threatened. Currently considered near-threatened. Uncommon in Thailand, where still fairly numerous in semi-evergreen forests in parts of NE & SE up to 800 m, in selectively logged forest. Caught in noose traps for food and for the cagebird trade.

Uncommon in Vietnam, where forests have been subject to heavy logging. Has bred and raised its young successfully in captivity in planted aviaries, although wild-caught birds are shy in captivity, and captive-raised young do not breed before 3 years of age.

Bibliography. Atkinson (1982), Collar *et al.* (1994), Delacour & Jabouille (1931), Eames (1996), Hughes (1997a), Inskipp *et al.* (1996), Lekagul & Round (1991), Robiller *et al.* (1992), Robson (1990c), Robson *et al.* (1993a), Round (1988), Schönwetter (1967), Stepanyan (1995), Walters (1996), Wheatley (1996), Wylie & Shelton (1982).



PLATE 65

inches 6
 cm 15

Tribe COUINI

Genus *COUA* Schinz, 1821

67. Snail-eating Coua

Coua delalandei

French: Coua de Delalande **German:** Delalande-Seidenkuckuck **Spanish:** Cúa de Delalande
Other common names: Delalande's Coua

Taxonomy. *Coccyzus* [sic] *Delalandei* Temminck, 1827, Madagascar. Monotypic.
Distribution. NE Madagascar, where only definitely known from Nosy Boraha (Île Sainte-Marie). Almost certainly extinct.



Descriptive notes. 56–57 cm. Large terrestrial coua. Adult black above with violet-blue sheen, long violet-blue tail tipped white; throat to breast white, belly rufous; bare skin of face blue, iris red, bill black, feet black. Juvenile unknown. **VOICE.** Unknown.
Habitat. Apparently restricted to primary rain forest, near sea-level.
Food and Feeding. Large forest snails. Obtained food by breaking snail shells against a stone anvil with its bill.
Breeding. Unknown.
Movements. Unknown. Presumably resident and sedentary.

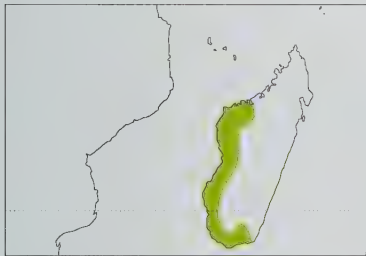
Status and Conservation. Almost certainly EXTINCT. Last reported on Nosy Boraha in 1834, with all 14 known museum specimens being taken no later than 1850. There is no certain evidence that it occurred on the mainland of Madagascar at any time. The species disappeared with deforestation. Secondary causes of loss include snaring and hunting for its feathers and meat, its stone anvils perhaps becoming the focus for hunters and ultimately monuments to the coua's extinction; possibly also affected by the introduction of rats, which may have reduced the mollusc diversity and numbers.
Bibliography. Ackerman (1841), Appert (1980), Benson & Schüz (1971), Benson *et al.* (1976–1977), Berlioz (1948), Collar & Andrew (1988), Collar & Stuart (1985), Collar *et al.* (1994), Dee (1986), Delacour (1932a), Dowsett & Forbes-Watson (1993), Fisher (1981), Fuller (1987), Goodman (1993), Greenway, J.C. (1967), Keith *et al.* (1974), Langrand (1990), Lavauden (1932), Milne-Edwards & Grandidier (1879), Milon (1952), Milon *et al.* (1973), Morgan (1975), Petter (1963), Rand (1936), Schifter (1973), Schuurman (1996), Sganzin (1840), Voisin & Voisin (1991).

68. Giant Coua

Coua gigas

French: Coua géant **German:** Riesen-Seidenkuckuck **Spanish:** Cúa Gigante
Other common names: Giant Madagascar Coucal

Taxonomy. *Cuculus gigas* Boddaert, 1783, Madagascar. Monotypic.
Distribution. S & W Madagascar, in coastal lowlands N to Betsiboka R.



Descriptive notes. 58–62 cm; 415 g. Adult dull olive-grey above, face black, tail glossy blackish with white tips; throat and upper breast creamy white, lower breast tan, belly rufous to black; bare skin around eye blue, pink behind eye, iris brown to red-brown, bill black, feet black. Juvenile duller, bill pale, fawn spots on wing and scapulars. **VOICE.** Calls from ground or in low tree, a deep “wok wok wok...” and guttural “ayoo-ew”, also a resonant “koo-kookookoogogo” with last 2 syllables lower; also short grunts.
Habitat. Deciduous forest, thorn scrub in areas of calcium-rich soil, forest and brush on sand, gallery forest, large trees with sparse understorey. Terrestrial, but nests in trees. Sea-level to 800 m. Co-exists with *C. coquereli*, *C. ruficeps* and *C. cursor*.
Food and Feeding. Diet consists of insects, mainly Lepidoptera, occasionally seeds. Obtains food by walking among dead leaves on forest floor; usually observed in pairs, but also alone or in small family groups.
Breeding. Nest a bowl of twigs, bark and large leaves, lined with leaf petioles, 3–10 m above ground in tree. Eggs 3, dull white; 43.5 x 32 mm.
Movements. Resident.
Status and Conservation. Not globally threatened. Uncommon in S of range, where it is subject to trapping and hunting, but very common at small (265 ha) Berenty Private Reserve, where well protected and very tame; this reserve is surrounded by completely deforested sisal plantations. Reported to be fairly common where good forest still exists, but such habitat is undergoing marked recession all over Madagascar.

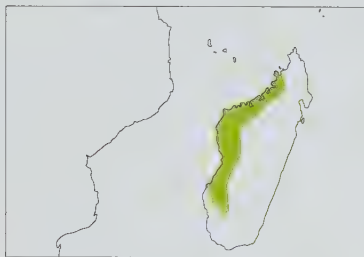
Bibliography. Adamson *et al.* (1982), Appert (1968a, 1968b, 1970, 1972, 1996), Bangs (1918), Benson (1981), Benson *et al.* (1976–1977), Berlioz (1948), Bradt *et al.* (1996), Chouteau (1997), Dee (1986), Delacour (1930, 1932a), Dowsett & Forbes-Watson (1993), Goodman & Ravoavy (1993), Langrand (1985, 1990), Lavauden (1937), Milne-Edwards & Grandidier (1879), Milon *et al.* (1973), Pidgeon & O'Connor (1985), Rand (1936), Salván (1972b), Wilmé *et al.* (1997), Young, G. (1995).

69. Coquerel's Coua

Coua coquereli

French: Coua de Coquerel **German:** Coquerel-Seidenkuckuck **Spanish:** Cúa de Coquerel
Other common names: Coquerel's Madagascar Coucal

Taxonomy. *Coua Coquereli* Grandidier, 1867, Morondava, Madagascar. Monotypic.
Distribution. W Madagascar.



Descriptive notes. 42 cm; 135 g (juvenile). Appears like a small version of *C. gigas*. Adult olive-green above, face black, tail tipped white; tan throat and breast, lower breast rufous, belly dull brown to black; bare skin around eye blue, behind eye pink, bill black. Juvenile duller, face lacks black outline feathers, wing-coverts brown with buff edge, underparts grey-barred whitish, skin around eye slightly feathered, dull blue, iris dark brown, bill flesh, culmen sepia, legs and feet grey. **VOICE.** Loud, clear “kewkiw-kewkewkew”, also grunts, and a high-pitched “ayoo-ew”.

Habitat. Dry forest and humid forest with limited ground cover, to lesser extent second growth, and ranging into edge of SW subdesert. Sea-level to 800 m. Lives alongside *C. gigas* and *C. ruficeps*, and is replaced in S of its range by *C. cursor*.
Food and Feeding. Insects, spiders and berries; fruit form 20% of diet. Feeds mainly on forest floor, on trails, but also in middle layers 1–5 m above ground.

Breeding. Nest a bowl of twigs, small branches, petioles and bark, 2 m above ground in dense bush. Eggs 2, dull white; 33.5 x 25 mm.
Movements. Resident.
Status and Conservation. Not globally threatened. Fairly common within its rather restricted range in W Madagascar, although it is subject to trapping and hunting. Occurs in several protected areas, e.g. Zombitsy Forest Reserve, and also Ankarafantsika Nature Reserve (62,520 ha) where it is common.

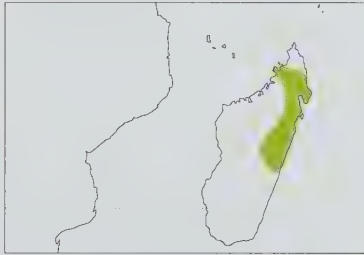
Bibliography. Andriamampianina (1981), Appert (1968a, 1970, 1972, 1980, 1996), Bangs (1918), Benson (1981), Benson *et al.* (1976–1977), Berlioz (1948), Bradt *et al.* (1996), Chouteau (1997), Dee (1986), Delacour (1930, 1932a), Dowsett & Forbes-Watson (1993), Kaudern (1922), Langrand (1985, 1990), Masuda & Ramanampamony (1996), Milne-Edwards & Grandidier (1879), Milon (1952), Milon *et al.* (1973), Rand (1936), Urano *et al.* (1994), Wilmé *et al.* (1997), Young, G. (1995).

70. Red-breasted Coua

Coua serriana

French: Coua de Serre **German:** Rotbrust-Seidenkuckuck **Spanish:** Cúa Pechirrojo
Other common names: Rufous-breasted Madagascar Coucal

Taxonomy. *Coua Serriana* Pucheran, 1845, Madagascar. Monotypic.
Distribution. NE Madagascar, from Zahamena to Sambava; Sambirano.



Descriptive notes. 42 cm; 298 g. Adult dark green-brown above, long blue-black tail, blackish brown below, chest dark rufous; bare skin around eye blue, iris brown, bill black. Juvenile with wing-coverts edged rufous, throat brown-olive (not black), belly olive, tail dull black without blue gloss, skin around eye feathered. **VOICE.** Noisy; repeated loud “koo ha”, a melodic “tee oooo”, also grunts.

Habitat. Undisturbed rain forest. Tends to occur in more open areas and at lower levels than *C. reynaudii*. Sea-level to 1000 m.

Food and Feeding. Berries and fruits; also seeds and insects. Mainly terrestrial, foraging

by walking on ground, or on horizontal branch; walks and runs, seldom flies; feeds beneath flocks of other frugivorous birds, on fruits fallen from trees.

Breeding. Nest a bowl of intertwined branches, 2–4 m above ground in a fern or pandanus. Eggs 2, white.
Movements. Resident.

Status and Conservation. Not globally threatened. Present in several protected areas, e.g. Mantadia National Park (10,000 ha), and recently established (1997) Masoala Peninsula National Park (over 200,000 ha) where large tract of lowland forest still persists. A fairly common species locally, but has a very restricted range and apparently fairly strict habitat requirements. For greater security, populations should be monitored.

Bibliography. Benson (1981), Benson *et al.* (1976–1977), Berlioz (1948), Bradt *et al.* (1996), Dee (1986), Delacour (1932a), Dowsett & Forbes-Watson (1993), Evans, M.I. *et al.* (1992), Langrand (1985, 1990), Milne-Edwards & Grandidier (1879), Milon (1952), Milon *et al.* (1973), Quansah (1988), Rand (1936), Safford & Duckworth (1990), Sganzin (1840), Thompson & Evans (1992), Thompson *et al.* (1987), Thorstrom & Watson (1997), Wilmé *et al.* (1997).

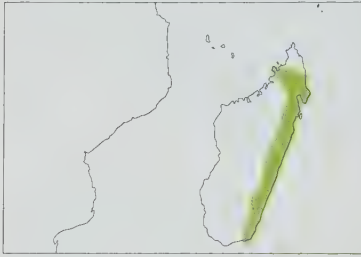
71. Red-fronted Coua

Coua reynaudii

French: Coua de Reynaud **German:** Rotstirn-Seidenkuckuck **Spanish:** Cúa Frentirrojo
Other common names: Reynaud's Coua, Red-fronted Madagascar Coucal

Taxonomy. *Coua Reynaudii* Pucheran, 1845, Madagascar. Monotypic.

Distribution. N & E Madagascar.



Descriptive notes. 38-40 cm; male 128 g, female 163 g. Adult olive-green above, crown rufous, face blackish, long tail green with blue gloss and dark tip; below, darker grey; bare skin around eye blue, iris brown, bill black. Juvenile with head and neck dull rufous-brown, wing-coverts and wing feathers tipped rufous, dull rufous below, bill yellow. Voice. Brief, raucous, plaintive "koo-ah", decreasing in volume, repeated several times.

Habitat. Dense vegetation in undisturbed rain forest and thick second growth, especially in tangles of fallen trees and branches, extends into brushy areas and clearings; also in dry forest in W of range. Terrestrial, but nests in trees. Sea-level to 2500 m.

Food and Feeding. Insects (beetles, grasshoppers, caterpillars), and sometimes lizards; also fruits and seeds. Moves slowly: walks on forest floor and low herbs, walks up sloping trunks, perches in trees.

Breeding. Breeds Aug-Jan. Nest a bowl of dry stalks, palm fibres and large leaves, c. 19 cm in diameter and 9 cm high, with wall 5 cm, inside bowl 10 x 6 cm; 5-7 m above ground in base of first leaves of pandanus or fern. Eggs 2, chalky, dull white; 36 x 28 mm.

Movements. Resident.

Status and Conservation. Not globally threatened. Relatively restricted range, but species apparently remains fairly common, and has been reported from more than 30 localities; more numerous at higher elevations.

Bibliography. Albiguac (1970), Benson *et al.* (1976-1977), Berlioz (1948), Bradt *et al.* (1996), Dee (1986), Delacour (1932a), Dowsett & Forbes-Watson (1993), Langrand (1985, 1990), Milne-Edwards & Grandidier (1879), Milon *et al.* (1973), Pidgeon & O'Connor (1985), Rand (1936), Salvan (1972a), Wilmé *et al.* (1997).

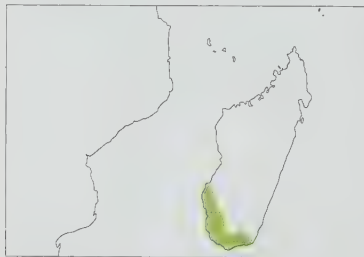
72. Running Coua

Coua cursor

French: Coua coureur **German:** Gelbkohl-Seidenkuckuck **Spanish:** Cúa Corredor
Other common names: Running Coual

Taxonomy. *Coua cursor* Grandidier, 1867, Cape Sainte-Marie and Machikora, Madagascar. Monotypic.

Distribution. SW & S coasts of Madagascar.



Descriptive notes. 34-40 cm; 118 g. Adult pale grey-green above, black line around face, tail grey (not bluish); throat tawny-buff, breast light purplish, belly whitish, flanks grey, undertail grey (not purplish); bare skin around eye blue with prominent pink patch to rear, iris brown, bill black, feet black. Juvenile duller, no black on face, back, rump and wing-coverts edged buff, bill pale. Voice. Loud, clear "kewkewkew-kookoor", also grunts, and ground call "ay-reeyoo".

Habitat. Subarid thorn scrub, spiny desert and dry woodlands with an absence of ground cover, in areas of subdesert brush and calcareous

plateau with low forest bush, but not in areas of *Euphorbia* bush alone. Sea-level to 200 m. Replaces *C. coquereli* in SW Madagascar.

Food and Feeding. Insects. Terrestrial; walks on ground.

Breeding. Breeds in rains; lays in Oct, young juveniles seen in Feb-Mar. Nest a bowl of twigs and bark, lined with leafstalks, 2 m above ground in a bush. Eggs 2, whitish; 34 x 23 mm.

Movements. Resident.

Status and Conservation. Not globally threatened. Appears to be generally uncommon within its small range, although locally fairly common, e.g. near Ifaty. Populations require monitoring.

Bibliography. Appert (1968a, 1970, 1980), Benson *et al.* (1976-1977), Berlioz (1948), Bradt *et al.* (1996), Chouteau (1997), Dee (1986), Dowsett & Forbes-Watson (1993), Langrand (1990), Milne-Edwards & Grandidier (1879), Milon *et al.* (1973), Pidgeon & O'Connor (1985), Rand (1936), Schuurman (1996), van Someren (1947), Wilmé *et al.* (1997).

73. Red-capped Coua

Coua ruficeps

French: Coua à tête rousse **German:** Weißkehl-Seidenkuckuck **Spanish:** Cúa Capirrojo
Other common names: Red-capped Madagascar Coual

Taxonomy. *Coua ruficeps* G. R. Gray, 1846, Madagascar.

Traditionally treated as two subspecies, but both *ruficeps* and *olivaceiceps* were collected at Mampikohy in Dec, in the breeding season, which, together with notable morphological differences, suggests that they may be distinct species. Two subspecies recognized.

Subspecies and Distribution.

C. r. ruficeps G. R. Gray, 1846 - W Madagascar, from Mahajanga W & S to near Morondava.

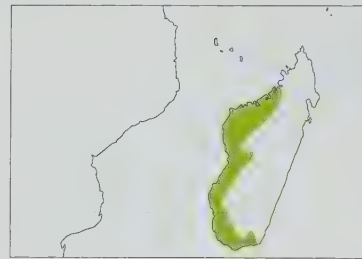
C. r. olivaceiceps (Sharpe, 1873) - SW Madagascar, from Morondava S to Anony L.

Descriptive notes. 42 cm; 190 g. Adult *ruficeps* light greenish brown above, front and top of head rufous, tail dark brown to purplish with white edge; throat white, lower throat tawny, chest light purplish, belly pale rufous to whitish; skin around eyes blue with black line below, iris dark brown, bill black, feet black. Juvenile dull, crown light brown. Race *olivaceiceps* paler above and below, crown light brown-green; juvenile with back barred, crown grey and slightly barred, wing-coverts tipped buff, breast barred grey on white. Voice. Loud "hug yew yew yew kuh kuh", last 2 notes lower, and loud call "coy coy coy"; also grunts.

Habitat. Dry deciduous forest, thorn scrub, second growth, gallery forest on edge of rivers, forested bottomlands. Sea-level to 850 m.

Food and Feeding. Insects (Orthoptera, beetles), also fruits. Feeds mainly on ground, in more open forest areas; walks on ground.

Breeding. Breeds Nov-Dec. Nest a shallow bowl of thin branches, bark and creepers, 20 cm x 5 cm thick, in a tree. Eggs 2 (1-3), white, tinged dull blue; 35 x 28 mm.



Langrand (1990), Masuda & Ramanampamonjy (1996), Milne-Edwards & Grandidier (1879), Milon (1952), Milon *et al.* (1973), Rand (1936), Salvan (1971), van Someren (1947), Steinbacher (1972), Urano *et al.* (1994), Wilmé *et al.* (1997), Young, G. (1995).

74. Crested Coua

Coua cristata

French: Coua huppé **German:** Spitzschopf-Seidenkuckuck **Spanish:** Cúa Crestado
Other common names: Crested Madagascar Coual

Taxonomy. *Cuculus cristatus* Linnaeus, 1766, Madagascar.

Four subspecies recognized.

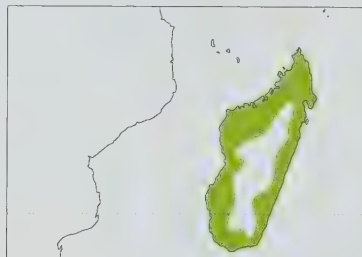
Subspecies and Distribution.

C. c. cristata (Linnaeus, 1766) - N & E Madagascar, SW to Mahajanga.

C. c. dumonti Delacour, 1931 - W Madagascar from Mahajanga to Morondava.

C. c. pyropyga Grandidier, 1867 - SW Madagascar between Morondava and Toliara, also S to Amboasary.

C. c. maxima Milon, 1950 - SE Madagascar (near Tolagnaro).



Descriptive notes. 40-44 cm; 136 g. Adult green-grey above, head crested, grey, long tail purplish blue, tipped white; throat grey, breast purplish to rufous, belly white; bare skin around eye blue outlined in black, iris brown, bill black, feet black. Juvenile with grey crown, rufous-edged back and wing-coverts, breast unbarred, feathered skin around eye, bill pale. Race *dumonti* larger on average (but much overlap in size), paler, faint rufous on undertail-coverts, broader white tail tip, and longer crest; *pyropyga* larger, paler, bright rufous on undertail-coverts, broad white tail tip; *maxima* largest and darkest. Voice. Loud, clear

"coy coy coy...", notes separated and decreasing in volume, also grunts.

Habitat. Primary and secondary forest, savanna, brushland, calcareous hills of SW coast, palms, and mangroves. Sea-level to 900 m.

Food and Feeding. Large insects (caterpillars, grasshoppers, beetles, cicadas), also snails, chameleons, and berries, seeds, fruits; takes gum from trees. Arboreal, foraging at higher levels of forest, more than 5m above ground, in canopy of littoral forest.

Breeding. Half-grown chick being fed by adults in Isalo National Park in Nov. Nest a bulky shallow bowl of twigs and rootlets, built by both sexes, 4-15 m above ground in tree. Eggs 2, dull white; 35 x 26.5 mm.

Movements. Resident.

Status and Conservation. Not globally threatened. Widespread, and locally common, persisting in degraded forests. Race *maxima*, however, appears to be exceedingly rare, known from just a single specimen.

Bibliography. Adamson *et al.* (1982), Appert (1970, 1972, 1996), Bangs (1918), Benson *et al.* (1976-1977), Berlioz (1948), Bluntschli (1935, 1938), Bradt *et al.* (1996), Charles-Dominique (1976), Chouteau (1997), Dee (1986), Delacour (1930, 1932a), Dowsett & Forbes-Watson (1993), Langrand (1985, 1990), Lavauden (1937), Masuda & Ramanampamonjy (1996), Milne-Edwards & Grandidier (1879), Milon (1950, 1952), Milon *et al.* (1973), Pidgeon & O'Connor (1985), Rand (1936), Schuurman (1996), van Someren (1947), Steinbacher (1972), Urano *et al.* (1994), Wilmé *et al.* (1997), Young, G. (1995).

75. Verreaux's Coua

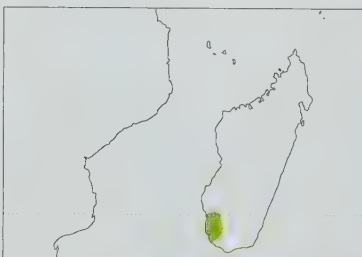
Coua verreauxi

French: Coua de Verreaux **German:** Breitschopf-Seidenkuckuck **Spanish:** Cúa de Verreaux
Other common names: Southern Crested Coua, Southern Crested Madagascar Coual

Taxonomy. *Coua Verreauxi* Grandidier, 1867, Cape Sainte-Marie, Madagascar.

Monotypic.

Distribution. SW Madagascar between R Onilahy and R Menarandra, E of Menarandra.



Descriptive notes. 34-38 cm. Adult green-grey above, head with light grey dark-tipped crest, tail glossy blue with white tip; white below; bare skin around eye blue with no black outline, iris yellow to brown, bill thin, black, feet black. Juvenile unknown. Voice. Call "coy coy coy", repeated, like that of *C. cristata* but briefer and more shrill; also loud "quark quark" followed by soft "coo coo", loud call at dusk "trew-ee trew-ee trew-ee" then soft "crow crow crow".

Habitat. Subarid thorn scrub, especially *Euphorbia* and *Didierea* brush, on sandy or calcareous soil. Sea-level to 100 m.

Food and Feeding. Insects, also fruit of *Cassia*. An arboreal forager.

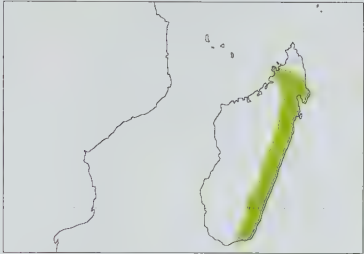
Breeding. Males singing from tree tops in Nov. No further information.

Movements. Resident.
Status and Conservation. Not globally threatened. Currently considered to be near-threatened. Range of present species is complementary to that of *C. cristata*, indicating a recent separation by speciation from it, or exclusion by interspecific competition, or both; the habitat occupied by present species is drier than that of *C. cristata*.
Bibliography. Adamson *et al.* (1982), Andriamampianina (1981), Bangs (1918), Benson (1981), Benson *et al.* (1976-1977), Berlioz (1948), Bradt *et al.* (1996), Dee (1986), Delacour (1932a), Dowsett & Forbes-Watson (1993), Langrand (1990), Lavauden (1937), Milon (1952), Milon *et al.* (1973), Rand (1936), Wilmé *et al.* (1997).

76. Blue Coua
Coua caerulea

French: Coua bleu **German:** Blau-Seidenkuckuck **Spanish:** Cúa Azul
Other common names: Blue Madagascar Coucal

Taxonomy. *Cuculus caeruleus* Linnaeus, 1766, Madagascar. Monotypic.
Distribution. Most of E & NW Madagascar.
Descriptive notes. 48-50 cm; 235 g. Adult dark blue above and below, wings and tail with violet sheen, no white tail tip; bare skin around eye blue, iris brown, bill black, feet black. Juvenile sooty-black on back and lower belly, wings dull blue, tail lacks violet; skin around eye feathered (not bare). **Voice.** Brief trilled "brrree-ee", increasing in volume; loud series of "coy coy coy coy", decreasing in intensity, low-pitched; also a grunt, "kroo kroo".



Habitat. Primary forest, also second growth and dense clove plantations, locally deciduous forest, mangroves. Sea-level to 1800 m.
Food and Feeding. Insects (cicadas, locusts, crickets, bees, beetles, caterpillars), small reptiles (chameleons), crabs, fruits; takes gum resins from trees, rich in polysaccharides. An arboreal coua, active from tree tops to undergrowth, mainly in middle stratum of forest; also runs on ground.
Breeding. Breeds Jul-Dec, mainly in rains. Nest domed, of interlaced dry plant material, 3-5-10 m above ground in dense foliage. Eggs 1, white; 37 x 28-5 mm.

Movements. Resident.
Status and Conservation. Not globally threatened. Common in suitable habitat throughout its range; not dependent on primary forest, as it survives in second growth. Taken for food by local inhabitants.
Bibliography. Albignac (1970), Benson *et al.* (1976-1977), Berger (1953a, 1953b), Berlioz (1948), Bradt *et al.* (1996), Charles-Dominique (1976), Dee (1986), Delacour (1930, 1932a, 1932b), Donnelly (1980), Dowsett & Forbes-Watson (1993), Goodman (1993), Langrand (1985, 1990), Lavauden (1937), Milne-Edwards & Grandidier (1879), Milon (1952), Milon *et al.* (1973), Pidgeon & O'Connor (1985), Rand (1936), Schönewetter (1967), Schuurman (1996), van Someren (1947), Wilmé *et al.* (1997).



Subfamily CENTROPODINAE

Genus *CENTROPUS* Illiger, 1811

77. Bay Coucal

Centropus celebensis

French: Coucal des Célèbes **German:** Celebeskuckuck **Spanish:** Cucal de Célebes
Other common names: Celebes/Celebean Coucal

Taxonomy. *Centropus celebensis* Quoy and Gaimard, 1830, Manado, Sulawesi. Forms a superspecies with *C. unirufus*. Two subspecies recognized.

Subspecies and Distribution.

C. c. celebensis Quoy & Gaimard, 1830 - N Sulawesi.

C. c. rufescens (A. B. Meyer & Wigglesworth, 1896) - C. E. S & SE Sulawesi, Labuan Blanda, Muna and Butung.



Descriptive notes. 44-50 cm. Adult mostly rufous, crown grey, back olive-grey, wings wine-rufous; iris red, bill black, horn at tip, feet black. Juvenile like adult, but paler throat and breast, iris light grey. Race *rufescens* has more rufous on head, back and breast. **Voice.** Call a hollow ranging "koo-ko-ko..." started by one bird and joined by others, and rapidly speeding up. Solitary birds give a repeated "wheeze". **Habitat.** Lowland and lower montane rain forest, in lianas and rattan thickets, ranging through forest edge into open woodland, scrub and dense secondary growth. Recorded from sea-level up to 1000 m.

Food and Feeding. Large insects, especially Orthoptera, locusts, beetles, spiders. Arboreal in behaviour, more like *Phaenicophaeus* than a typical *Centropus*, climbing through lianas and thick foliage, often in small groups; reported to associate frequently with malkohas and troops of macaques. **Breeding.** No information.

Movements. Resident.

Status and Conservation. Not globally threatened. Status and biology very poorly known; research required. Locally common, e.g. in Dumoga-Bone National Park in mid-1980's. Occurrence in wide range of habitats, including secondary growth, suggest species may be relatively adaptable. **Bibliography.** Andrew (1992), Coates & Bishop (1997), Fraser & Henson (1996), Hachisuka (1934), Holmes & Philipps (1996), Jepson (1997), Rozendaal & Dekker (1989), Stresemann (1940), Watling (1983), Wheatley (1996), White & Bruce (1986).

78. Rufous Coucal

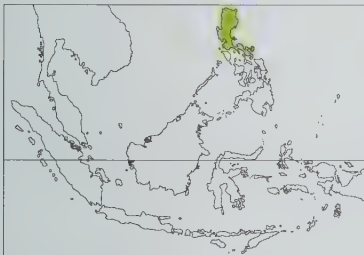
Centropus unirufus

French: Coucal roux **German:** Bambuskuckuck **Spanish:** Cucal Rufo

Taxonomy. *Pyrrhocentor unirufus* Cabanis and Heine, 1863, Luzon.

Forms a superspecies with *C. celebensis*. Monotypic.

Distribution. Luzon, Polillo and Catanduanes (N Philippines).



Descriptive notes. 38-42 cm; 184 g. Adult rufous, bare skin around eye yellow, iris light brown, bill greenish with yellow tip, feet black. Juvenile as adult, but white hair-like down on head, bill black. **Voice.** Call a shrill, plaintive "kaow" when separated from its mate.

Habitat. Hill forest in matted undergrowth, tangled lowland forest with bamboo, usually on or near ground, also into trees.

Food and Feeding. Not known.

Breeding. No information.

Movements. Resident.

Status and Conservation. Not globally threatened. Currently considered near-threatened.

Situation may be somewhat precarious because of restricted range and the loss of forest habitat therein. The species is uncommon and local. Present in Angat forest near Manila.

Bibliography. Collar *et al.* (1994), Danielsen *et al.* (1994), Delacour & Mayr (1946), Dickinson *et al.* (1991), DuPont (1971), Gilliard (1950b), Gonzales (1983), Goodman & Gonzales (1990), Hachisuka (1934), Hornskov (1992), McGregor (1909-1910), Poulsen (1995).

79. Black-faced Coucal

Centropus melanops

French: Coucal à face noire **German:** Maskenkuckuck **Spanish:** Cucal Carinegro

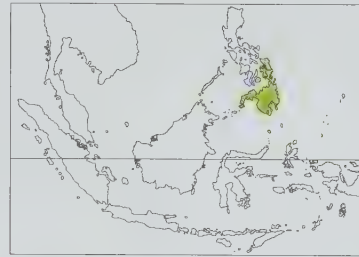
Taxonomy. *Centropus melanops* Lesson, 1830, Java; error = Mindanao.

Race *banken* doubtfully valid. Two subspecies normally recognized.

Subspecies and Distribution.

C. m. Banken Hachisuka, 1934 - Bohol, Leyte, Biliran and Samar (EC Philippines).

C. m. melanops Lesson, 1830 - Nipah, Dinagat, Siargao, Mindanao and Basilan (SE Philippines).



Descriptive notes. 42-48 cm; male 213 g, female 214 g. Adult black above, head, neck and breast pale buff, face black, wings brown, tail glossy black, lower breast and belly black; iris red, bill black, feet black. Female larger. Juvenile as adult. Race *banken* has slightly more black on forehead. **Voice.** Not described.

Habitat. Forests, in tree tops and tangled undergrowth, second growth. Lowlands to 1200 m.

Food and Feeding. Not described.

Breeding. Nest undescribed. Eggs white; 37 x 29 mm.

Movements. Resident.

Status and Conservation. Not globally threatened. This was a common species in Mindanao 60 years ago, but the forests have now almost completely disappeared; still common at PICOP, near Bislig. It seems likely that further forest destruction will lead to this coucal's inclusion on the list of endangered species.

Bibliography. Delacour & Mayr (1946), Dickinson *et al.* (1991), DuPont (1971), DuPont & Rabor (1973b), Dutson *et al.* (1995), Hachisuka (1934), McGregor (1909-1910), Parkes (1971a), Rand & Rabor (1960), Schönwetter (1967).

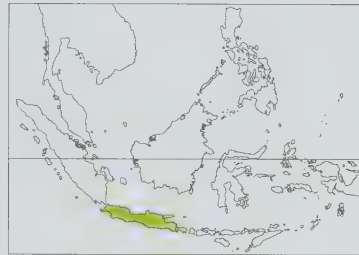
80. Sunda Coucal

Centropus nigrorufus

French: Coucal noirou **German:** Sundakuckuck **Spanish:** Cucal de la Sonda
Other common names: Javan Coucal

Taxonomy. *Cuculus nigrorufus* Cuvier, 1817, Java. Monotypic.

Distribution. Java.



Descriptive notes. 46 cm. Adult glossy black above with stiff hackles, purplish gloss on mantle, wings rufous with blackish tips to flight-feathers and upperwing-coverts, long black tail; purplish-glossed black below; iris red, bill black, feet black. Female slightly larger. Juvenile as adult. **Voice.** Not described.

Habitat. Mangrove and other swamps, especially in estuaries, thickets and elephant grass in coastal lowlands, palm vegetation behind mangroves; possibly also inland grass swamps.

Food and Feeding. Insects (grasshoppers, beetles, hairy caterpillars), frogs.

Breeding. Nest undescribed. Eggs white; 39 x

31 mm.

Movements. Resident.

Status and Conservation. **VULNERABLE.** Confined to Java, where it occurs in fragmented small local populations, and remains locally common in remnant coastal wetlands. It is possibly threatened as its habitat is being converted to fish and shrimp ponds and agricultural land, as a result of which present species is replaced by *C. bengalensis*. An old record from inland teak forest and sightings in scrub away from coastal wetlands, together with its appearance in local bird markets, suggest, however, that it is likely to be more widespread and that it occurs in a greater variety of habitats than previously recognized. This coucal may possibly be present also in Sumatra, from where there is an old specimen of doubtful origin, as well as recent sight reports.

Bibliography. Andrew, P. (1988, 1990, 1992), Collar & Andrew (1988), Collar *et al.* (1994), Finsch (1902), Hellebrekers & Hoogerwerf (1967), Holmes & Nash (1989), Hoogerwerf (1948a, 1970), Jepson (1997), Kuroda (1933-1936), MacKinnon (1988), MacKinnon & Philipps (1993), Neumann (1902), Robson (1989, 1991b), Sody (1989), Sujatnika & Jepson (1995), Sujatnika *et al.* (1995), Wheatley (1996).

81. Buff-headed Coucal

Centropus milo

French: Coucal à tête fauve **German:** Bläkopfkuckuck **Spanish:** Cucal Milo

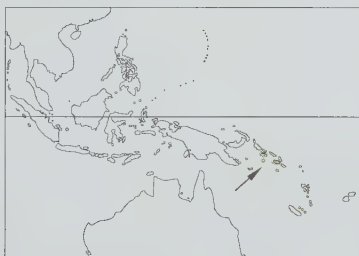
Taxonomy. *Centropus Milo* Gould, 1856, Guadalcanal, Solomon Islands.

Two subspecies recognized.

Subspecies and Distribution.

C. m. albidiventris Rothschild, 1904 - Vella Lavella, Kolombangara, Near Georgia, Gizo and Rendova (WC Solomons).

C. m. milo Gould, 1856 - Guadalcanal and Florida Is (S Solomons).



Descriptive notes. 60-68 cm. Adult black except for buff foreparts; iris red to red-brown, bill black, basal skin deep grey, feet blue-grey. Juvenile brown, mottled with black, wings and long tail rufous, barred blackish, iris grey to brown, bill brown, lower mandible pale horn to whitish. Race *albidiventris* wholly whitish below. **Voice.** A "sawing" or "snoring" noise; pair members alternate "urrrh" with "uh"; solitary birds give a guttural "kkkkow...kkkk...kk...kk", a throaty bark, and a deep churring "argh-a-argh", juveniles a stuttering cough.

Habitat. Lowland, hill and mist forest; primary and secondary forest and thickets in gardens.

Food and Feeding. Insects, including stick insects, grasshoppers, beetles, pupae; giant centipedes. Feeds mainly on the ground, but also occasionally ascends into trees.

Breeding. No information.
Movements. Resident.

Status and Conservation. Not globally threatened. Common on New Georgia, where can be found in secondary growth and near human habitation. Little known: research and survey work required.
Bibliography. Blaber (1990), Cain & Galbraith (1956), Dahl, (1986), Hartert (1925b), Sibley (1951).

82. Goliath Coucal

Centropus goliath

French: Coucal goliath **German:** Goliathkuckuck **Spanish:** Coucal Goliat
Other common names: Giant/Large Coucal

Taxonomy. *Centropus goliath* Bonaparte, 1850, Halmahera.
Forms a superspecies with *C. violaceus* and *C. menbeki*. Monotypic.

Distribution. N Moluccas, on Ternate, Morotai, Halmahera, Tidore, Bacan and Obi.



Descriptive notes. 62-70 cm. Adult black, with bluish wings and tail, white patch on greater wing-coverts; on Halmahera, also a whitish morph, with buffish on head, and occasional pied individuals; iris dark brown, bill black, feet black. Juvenile black above, wing-coverts with white patch, head, neck and underparts chestnut with whitish diamond-shaped streaks, belly blackish (no known pale morph juveniles). **VOICE.** No information available.

Habitat. Forested areas of all types, including larger patches of scrub at edge of agricultural land on Halmahera; primary and logged forest to 250 m on Bacan.

Food and Feeding. No information on diet. Feeds in lower forest subcanopy to 12 m, as well as in understorey.

Breeding. Little information. Nestling with long white hair-like down, especially on head.

Movements. Resident.

Status and Conservation. Not globally threatened. Common and conspicuous on Halmahera, but not recorded recently on smaller islands of Obi and Ternate.

Bibliography. Andrew (1992), van Bemmel (1948), Coates & Bishop (1997), Hartert (1903a), Jepson (1997), Lambert (1994b), Lambert & Young (1989), Sujatnika *et al.* (1995), Wheatley (1996), White & Bruce (1986).

83. Violaceous Coucal

Centropus violaceus

French: Coucal violet **German:** Purpukuckuck **Spanish:** Cocal Violáceo
Other common names: Giant Forest Coucal

Taxonomy. *Centropus violaceus* Quoy and Gaimard, 1830, Carteret Harbor, New Ireland.
Forms a superspecies with *C. goliath* and *C. menbeki*. Monotypic.

Distribution. New Britain and New Ireland.



Descriptive notes. 64 cm; 500 g. Adult black with violet sheen, tail broad, bare skin around eye greyish, eye-ring black, iris red, bill black, feet pale slaty-horn. Juvenile dull black above, wings and tail glossed purple, underparts downy, sooty-grey, iris light grey. **VOICE.** Deep, hollow booming notes and loud booming duets.

Habitat. Occurs in primary forest from lowlands up to 950 m.

Food and Feeding. Large insects, including stick insects almost 18 cm long; also frogs and tiny snails. Active in limbs of trees and vines.

Breeding. Nest a loose structure of twigs, built in top of a tall tree. Eggs 3, white; 42.5 x 34

mm. Nestling has black skin, long white feather sheaths on head and back, mouth purplish pink with white Y-shaped ridge on palate, white edge of tongue, feet bluish grey.

Movements. Resident.

Status and Conservation. Not globally threatened. Virtually no information available on status, as range comprises zone of extremely limited ornithological exploration; species considered to be widely but thinly distributed in suitable habitat throughout range in mid-1980's.

Bibliography. Coates (1985), Dahl (1986), Diamond (1972b), Eastwood (1995c), Gilliard (1961), Gilliard & LeCroy (1967a), Hariert (1925b), Orenstein (1976), Schönwetter (1967).

84. Greater Black Coucal

Centropus menbeki

French: Coucal menébeki **German:** Mohrenkuckuck **Spanish:** Cocal Menebiki
Other common names: Greater Coucal(!)

Taxonomy. *Centropus Menbeki* Garnot, 1828, New Guinea = Manokwari.

Forms a superspecies with *C. goliath* and *C. violaceus*. Original spelling is *menbeki*, although listed by Lesson and Garnot in 1829 as "*menebiki*", based on a local Papuan word. Three subspecies recognized.

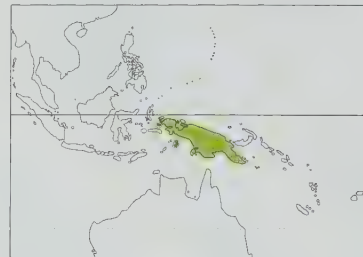
Subspecies and Distribution.

C. m. menbeki Garnot, 1828 - New Guinea, W Papuan islands and Numfor I.

C. m. jobiensis Stresemann & Paludan, 1932 - Yapen I.

C. m. aruensis (Salvadori, 1878) - Aru Is.

Descriptive notes. 60-67 cm; race *jobiensis* male 480 g and female 553 g, race *menbeki* male 293 g. Adult huge, glossy black, with long tail, iris red, bill whitish with black base, legs black. Juvenile dull, blackish, with narrow rufous bars at base of tail, iris tan or orange. Race *menbeki* darker above, smaller; *aruensis* dark purplish black above; *jobiensis* less purplish, more greenish. **VOICE.** Low-pitched, resonant booming hoots in staccato; single-note "oodle", also pairs of "hoo hoo", and descending series of "Uh-oo-oo-oo-oo-oh"; a grunt followed by a dry rattle. Calls at night.



Habitat. Forest, forest edge, shrub and lower middle storeys. Sea-level to 800 m.

Food and Feeding. Small vertebrates (snakes, frogs, small birds), arthropods, large insects (grasshoppers, cicadas, caterpillars). Feeds on ground, where movements clumsy, and in vines; hops up tree trunks, switching tail from side to side.

Breeding. Oviduct egg in Apr; recently fledged young Jan, Oct. Nest a large mass of leaves, in pandanus, in wet season. Oviduct egg white; 37 x 30 mm.

Movements. Resident.

Status and Conservation. Not globally threatened. A widely distributed species in New Guinea, but apparently uncommon throughout. Approximate density estimated at 1 bird/10 ha.

Bibliography. Andrew (1992), Beehler (1978b), Beehler, Burg *et al.* (1994), Beehler, Pratt & Zimmerman (1986), Bell (1982), Burrows (1993), Coates (1985), Diamond (1972a), Eastwood (1995b), Gilliard & LeCroy (1966), Gregory (1995a, 1995b), Hartert (1930), Hiaso *et al.* (1994), Mayr & Meyer de Schauensee (1939b), Mayr & Rand (1937), Rand (1942a, 1942b), Rand & Gilliard (1967), Ripley (1964), Stoner (1937).

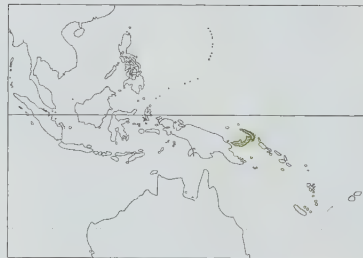
85. Pied Coucal

Centropus ateralbus

French: Coucal atralbin **German:** Weißkopfkuckuck **Spanish:** Cocal Blanquinegro
Other common names: White-necked Coucal

Taxonomy. *Centropus ateralbus* Lesson, 1826, New Ireland.
Monotypic.

Distribution. New Britain and New Ireland.



Descriptive notes. 44-48 cm; male 330 g, female 342 g. Adult black, face and flight quills glossy purplish blue, with neck and upper breast and patch on wing white (or brownish white or pearly-grey instead of white). Also several colour morphs, including: all white with black forehead and lores; all white on head and mantle; black only on crown; all black but for white wing patch. Iris red, bill black, legs slaty-blue to black. Immature blackish, with white feathers on neck and wing. Juvenile with anterior half of body striped buff or rufous, iris grey, legs blue-grey. **VOICE.** Alarm a short "chit"; song a duet by two birds sounding like two hollow metal drums, "soo-hoo", rising in pitch and lasting up to 17 sec; also a nasal "k-k-k-naahh".

Habitat. Forest, forest edge, secondary forest, strand vegetation by shore cultivations, near forest floor. Sea-level to 1200 m.

Food and Feeding. Insects, including large stick insects, also other small animals. Active, clumsy.

Breeding. Nest a hollow or chamber, lined with green vegetation. Eggs 2, whitish; 41 x 33 mm.

Movements. Resident.

Status and Conservation. Not globally threatened. True status very poorly known, but species appears to be uncommon in uplands of New Britain. Research and survey work required.

Bibliography. Beehler (1978a), Coates (1985), Dahl (1986), Diamond (1972b), Eastwood (1995c), Gilliard & LeCroy (1967a), Halliday (1992), Meyer (1936), Orenstein (1976), Schönwetter (1967).

86. Pheasant Coucal

Centropus phasianinus

French: Coucal faisán **German:** Fasanspornkuckuck **Spanish:** Cocal Faisán

Taxonomy. *Cuculus phasianinus* Latham, 1801, New South Wales. Forms a superspecies with *C. spilopterus*, *C. bernsteini* and *C. chalybeus*. Form *mui* of Timor may possibly represent a separate species, but to date known only from a single specimen. Six subspecies recognized.

Subspecies and Distribution.

C. p. mui Mason & McKean, 1984 - Timor.

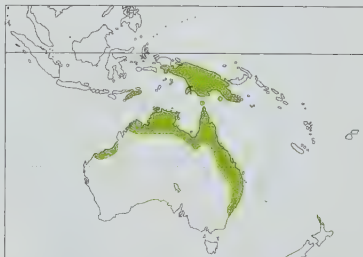
C. p. propinquus Mayr, 1937 - N New Guinea.

C. p. nigricans (Salvadori, 1876) - SE New Guinea and Yule I.

C. p. thierfelderi Stresemann, 1927 - S New Guinea and NW Torres Strait islands.

C. p. melanurus Gould, 1847 - N & NW Australia.

C. p. phasianinus (Latham, 1801) - E Australia.



Descriptive notes. 53-80 cm; in N New Guinea male 205 g and female 300 g, in Australia male 337 g and female 495 g. Long-tailed pheasant-like bird. Adult male all black, streaked and barred brown above, wing with inner webs rufous, outer webs barred buff, black and rufous-brown; iris red, bill black, feet blackish. Female larger, iris orange to yellow. Non-breeding plumage (Australia) rufous above with straw-coloured streaks, head and underparts buff; iris pale brown (female whitish), bill pale horn. Juvenile more fawn, paler below, iris brown, bill brown to pale below. Race *nigricans* has yellowish underwing bars narrower than black bars;

propinquus similar, but smaller; *thierfelderi* has rufous bars on underwing as wide as or wider than black bars; *melanurus* larger than *phasianinus*, wider black bars on rectrices; *mui* extensively white. **VOICE.** Dull booming series of "hoo" notes, falling and then rising in pitch, "coo-coo-coo-coo-coo-coo-coo-coo", accelerates in tempo; often duets; also harsh scolding calls, and a hiss in alarm.

Habitat. Dense riverine vegetation, long grass, rank herbage, coastal heathlands, margins of swamps, canefields, lantana and pandanus thickets, mangroves, secondary forests, spinifex in sandstone country. Lowlands, not in New Guinea highlands.

Food and Feeding. Arthropods, especially insects (grasshoppers, stink-bugs, mantids, stick insects, caterpillars), *Sesarma* mangrove mud crabs, snails; frogs, lizards, nestling birds, small mammals including rodents and bandicoots. Skulking, spends much time on ground, clammers in thick vegetation; searches for food by walking in low dense vegetation and ground cover, then runs down its prey.

Breeding. In Australia, breeds Sept-May in Queensland, Nov-Mar in Kimberley Division, Dec-Apr in Northern Territory. Nest a covered mass of grass, lined with leaves, open at either end; begun as platform, then blades and stems drawn together to form a cover, then nest-lining added, sometimes with an extension tube; in tussock near ground. Eggs 3-5 (2-7), white, stained brown; 38 x 29 mm; incubation 15 days, by both sexes, starts with first egg, green leafy twigs added through period. Nestling black with long white hair-like down, mouth red, tongue red with black tip; fed by both sexes, eyes open at 7 days, may then leave nest if disturbed, short-tailed young seen carried by feet of parent in flight; fledging normally 17 days (hand-reared bird), young do not return to nest, hair-like down disappears within a week of fledging; independent at 40 days. Female may lay several clutches in a season.

Movements. Resident.

Status and Conservation. Not globally threatened. Common near the coast, uncommon in semi-arid areas, scarce in arid zone. This species has become uncommon in Pilbara Region, Western Australia, where earlier it was moderately common. Population density in woodland of S New Guinea calculated at c. 0.1 bird/ha.

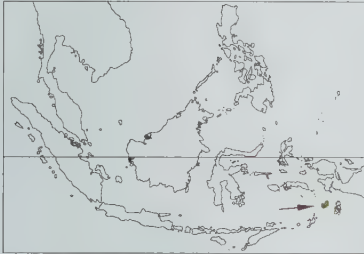
Bibliography. Beehler *et al.* (1986), Bell (1969b, 1970a, 1982, 1984a), Beruldsen (1980), Blakers *et al.* (1984), Coates (1985), Coates & Bishop (1997), Ford (1987b), Frauca (1967, 1974), Hall (1974), Hartert (1930), Hicks & Restall (1992), Hindwood (1942, 1957), Mackness (1979), Mason & McKean (1984), Mayr (1937), Mayr & Rand (1937), Mees (1982a), Mills (1987b), Pratt (1972), Rand & Gilliard (1967), Rose (1997a), Rutgers & Norris (1972), Serventy & Whittell (1976), Storr (1977, 1980, 1984a, 1984b), Strahan (1994), Taplin & Beurteaux (1992), White & Bruce (1986).

87. Kai Coucal
Centropus spilopterus

French: Coucal des Kai **German:** Kaikuckuck **Spanish:** Cucal de las Kai

Taxonomy. *Centropus spilopterus* G. R. Gray, 1858, Kai Islands.
Forms a superspecies with *C. phasianinus*, *C. bernsteini* and *C. chalybeus*. Monotypic.

Distribution. Kai Is (SE Moluccas).



Descriptive notes. 60 cm. Adult black, feather shafts glossy black, long tail glossed green, iris red, bill black, feet black. Female larger. Juvenile barred dark brown and buff, bill reddish brown, iris reddish brown. Voice. Not known.

Habitat. Insufficient information.

Food and Feeding. Unknown.

Breeding. Breeding season: nestling in Jul. Nest not described. Eggs white; 36 x 27 mm. Nestling similar to juvenile, often barred whitish, iris brown, bill black.

Movements. Resident.

Status and Conservation. Not globally threatened. Currently considered near-threatened. Very

restricted range, with no details available about relative densities. Very little is known about this coucal, and even basic habitat preferences remain to be established. Considerable field research is required.

Bibliography. Andrew (1992), Coates & Bishop (1997), Collar *et al.* (1994), Hartert (1903b), Jepson (1997), Sujatnika *et al.* (1995), Wheatley (1996), White & Bruce (1986).

88. Lesser Black Coucal
Centropus bernsteini

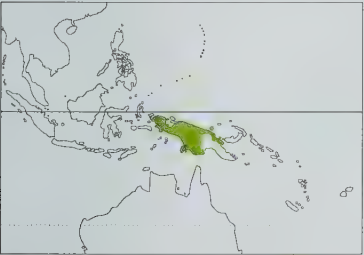
French: Coucal de Bernstein **German:** Bernsteinkuckuck **Spanish:** Cucal de Bernstein
Other common names: Black Scrub/Bernstein's Coucal

Taxonomy. *Centropus Bernsteini* Schlegel, 1866, New Guinea.
Forms a superspecies with *C. phasianinus*, *C. spilopterus* and *C. chalybeus*. Two subspecies recognized.

Subspecies and Distribution.

C. b. bernsteini Schlegel, 1866 - W & C New Guinea E to Simbang and the Sattelberg.

C. b. manam Mayr, 1937 - Manam I (NE New Guinea).



Descriptive notes. 46-52 cm; male 140 g, female 180 g. Adult black, glossed green above, iris dark brown, bill black. Juvenile barred rufous above, wings and tail narrowly barred buff to pale chestnut, throat whitish, neck marked with chestnut-brown, central belly grey with dark bars, rest of underparts blackish brown with narrow pale barring. Race *manam* larger. Voice. Three hoots, "woop woop woop", on descending scale, sometimes in longer series; pairs often duet.

Habitat. Scrub, tall cane grass, rank vegetation. Sea-level to 500 m, rarely to 900 m.

Food and Feeding. Unknown.

Breeding. Nest a domed mass of cane grass, with side opening, placed in grass. Eggs 2, white; 32 x 26 mm.

Movements. Resident.

Status and Conservation. Not globally threatened. This coucal is not uncommon in second growth and cane grass, but is shy and difficult to observe. Poorly known in all aspects; research required.

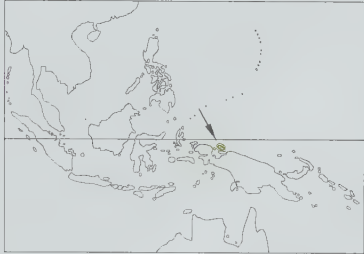
Bibliography. Andrew (1992), Anon. (1994b), Bailey (1992a), Beehler (1978b), Beehler *et al.* (1986), Burrows (1993), Coates (1985), Gilliard & LeCroy (1966), Gregory (1995a, 1995b), Hartert (1930), Jepson (1997), Maxwell (1938), Mayr (1937), Rand (1942b), Rand & Gilliard (1967), Ripley (1964), Rothschild & Hartert (1915), Rutgers & Norris (1972).

89. Biak Coucal
Centropus chalybeus

French: Coucal de Biak **German:** Biakuckuck **Spanish:** Cucal de Biak

Taxonomy. *Nesocentor chalybeus* Salvadori, 1875, Biak.
Forms a superspecies with *C. phasianinus*, *C. spilopterus* and *C. bernsteini*. Monotypic.

Distribution. Biak I in Geelvink Bay, N New Guinea.



Descriptive notes. 44-46 cm. Adult black, glossed purple above, spiny feathers on foreparts, iris yellow, bill black (straighter than that of *C. menbeki*). Juvenile washed rufous, unbarred. Voice. Loud: a hollow note, repeated, a descending series of upslurred hoots going up and down in waves, a harsh rasp, and a repeated "bup".

Habitat. Primarily lowland forest, also second growth.

Food and Feeding. Diet unknown. Feeds on ground, also in vines and in trees; noisy on ground, where hops; flies awkwardly, like other coucals.

Breeding. No information.

Movements. Resident.

Status and Conservation. Not globally threatened. Currently considered near-threatened. According to one report, hunting and habitat destruction have severely reduced numbers in S of island, so main stronghold of species would appear to be forests of Supiori. Very poorly known; research required.

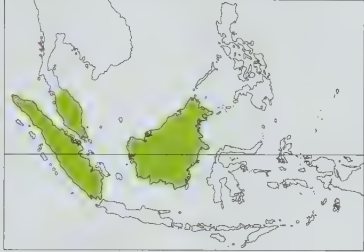
Bibliography. Andrew (1992), Beehler *et al.* (1986), Bishop (1982), Collar *et al.* (1994), Jepson (1997), Mayr & Meyer de Schauensee (1939a), Rand & Gilliard (1967), Sujatnika *et al.* (1995).

90. Short-toed Coucal
Centropus rectunguis

French: Coucal de Strickland **German:** Kurzspornkuckuck **Spanish:** Cucal de Strickland

Taxonomy. *Centropus rectunguis* Strickland, 1847, Malacca.
Monotypic.

Distribution. Peninsular Malaysia, Sumatra and Borneo.



Descriptive notes. 43 cm; male 160 g, female 167 g. Similar to *C. sinensis*, but smaller and shorter-tailed. Adult black, glossed purplish blue, with chestnut wings, black tail, iris red, bill black, feet black. Female slightly larger. Juvenile barred blackish and rufous-buff above, upper head brown-streaked chestnut, wings chestnut, coverts with black bars, tail black with fine white bars, chin to belly dark brown with dull white barring (some are nearly black below, others brown), iris red, bill brown, paler below, feet blackish. Voice. Four to five resonant booming notes, "buup", on descending scale, like those of *C. sinensis* but deeper and

slower, more hoarse and resonant; also rapid series of resonant, rising notes at dusk.

Habitat. Lowland closed-canopy forest (alluvial forest, peat swamp forest, riverine forest); also reported in coastal scrub, casuarinas, long grass, dense jungle. Lowlands to 1700 m.

Food and Feeding. Presumably mainly insects, as in other coucals.

Breeding. Nest undescribed. Eggs white; 37 x 30 mm; no information on clutch size.

Movements. Resident.

Status and Conservation. Not globally threatened. Currently considered near-threatened. May be at risk owing to habitat specialization, low colonizing ability, and possible competition from other species of coucal. In Sumatra, survives in undisturbed primary and selectively logged forest and at forest edge; reported as occurring in tall grass in Borneo, from where only 4 specimens are known.

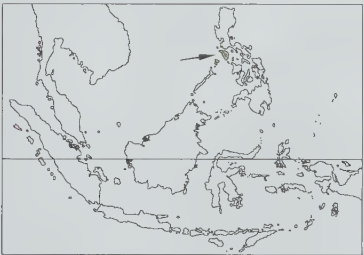
Bibliography. Andrew (1992), Chasen (1939), Collar & Andrew (1988), Duckworth & Kelsh (1988), Gibson-Hill (1949), Holmes (1995a, 1996), Holmes & Burton (1987), Jepson (1997), MacKinnon & Phillippis (1993), van Marle & Voous (1988), Medway & Wells (1970, 1976), Mees (1986), Robson (1991a), Schönwetter (1967), Smythies (1981), Wells (1972b), Wheatley (1996).

91. Black-hooded Coucal
Centropus steerii

French: Coucal de Steere **German:** Mindorokuckuck **Spanish:** Cucal de Mindoro
Other common names: Steere's Coucal

Taxonomy. *Centropus steerii* Bourns and Worcester, 1894, Mindoro.
Monotypic.

Distribution. Mindoro (NC Philippines).



Descriptive notes. 46 cm. Adult head black, glossed blue green, neck, back and wings brownish black, breast and belly dark brown, iris brown, bill black. Female larger. Juvenile as adult, but lacks hackles, back feathers soft-webbed, chin and throat brown (not black), bill pale and not so deep as adult's. Voice. Not known.

Habitat. Primary forest. Lowlands to 750 m.

Food and Feeding. Unknown.

Breeding. Unknown.

Movements. Resident.

Status and Conservation. CRITICALLY ENDANGERED. This coucal is close to extinction in its highly restricted range, where it is threatened by the widespread loss of primary forest in the lowlands. It is likely to become extinct within 10-20 years. Where its forest habitat has been degraded, it has been replaced by *C. viridis*. In 1990's, present species has been observed only at Malpalon and Sablayan, with only *C. viridis* noted at all other forest sites.

Bibliography. Brooks, Dutson *et al.* (1995), Collar & Andrew (1988), Collar *et al.* (1994), Custodio *et al.* (1994), Delacour & Mayr (1946), Dickinson *et al.* (1991), DuPont (1971), Dutson *et al.* (1992), Evans, Dutson & Brooks (1993), Hachisuka (1934), Ogilvie-Grant (1896), Ripley & Rabor (1958), Robson (1992, 1993), Whitehead (1899).

ssp parroti

ssp kangeanensis

92

ssp bubutus

93

ssp sinensis

normal morph

ssp viridis

94

white morph

ssp mindoroensis

95

96

97

98

99

100

101

102

ssp leucogaster

ssp neumanni

103

ssp aegyptius

ssp senegalensis

normal morph

dark morph

ssp loandae

ssp superciliosus

104

ssp burchelli



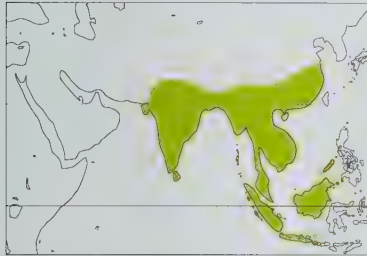
92. Greater Coucal

Centropus sinensis

French: Grand Coucal **German:** Heckenkuckuck **Spanish:** Cucal Chino
Other common names: Common/Large Coucal, Common Crow-pheasant, Lark-heeled Cuckoo

Taxonomy. *Polophilus sinensis* Stephens, 1815, Ning Po, China. Forms a superspecies with *C. andamanensis*, the two sometimes being treated as conspecific. Birds from Malaysia, Sumatra, Borneo and Palawan are sometimes placed together in a separate race *eurycerus*. Race *anonymus* sometimes misspelt “*anonymous*”. Six subspecies recognized.

Subspecies and Distribution.
C. s. sinensis (Stephens, 1815) - Pakistan (Sind, Punjab) and Kashmir through N India (Himalayas and Gangetic Plain) to Bengal, Sikkim and N Assam and foothills in Bhutan, and on to S China (Guanxi, Zhejiang, Fujian).
C. s. parroti Stresemann, 1913 - peninsular India and Sri Lanka.
C. s. intermedius (Hume, 1873) - Bangladesh and S Assam E through Myanmar to SC China (S Yunnan and Hainan), and S to Thailand, Indochina and Peninsular Malaysia.
C. s. bubutus Horsfield, 1821 - Sumatra, Nias and Mentawai Is to Borneo and W Philippines (Balabac, Cagayan Sulu, Palawan), and S to Java and Bali.
C. s. anonymus Stresemann, 1913 - SW Philippines (Basilan, Sulu Is).
C. s. kangeanensis Vorderman, 1893 - Kangean Is.

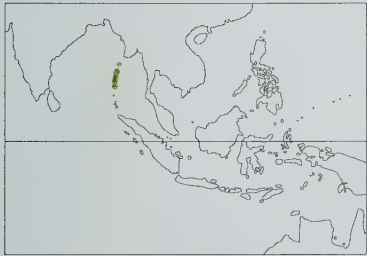


with throat grey, breast mottled grey). Voice. Song a series of deep “hoop” notes, full song running down and up the scale, followed by more “hoop” notes: a “tok”, also a harsh scold, “skaaah”.
Habitat. Secondary forest, tall grassland, thickets, bamboo, scrub near cultivation, paddyfields, cover near streams and swamps, mangroves, gardens; widespread, except in dense primary forest. Lowlands, in hills to 1200 m, occasionally to 2100 m.
Food and Feeding. Small mammals (mice, hedgehog), lizards, snakes, frogs; insects (caterpillars, grasshoppers, katydids, beetles, larvae of rhinoceros beetles); also centipedes, scorpions, spiders, crabs, snails, slugs, eggs and nestlings of small birds, fruits and seeds. Terrestrial and skulking, stalks, walks, hops and runs in pursuit of prey; creeps through shrubs and robs birds’ nests; prowls on mud banks of rivers near water’s edge.
Breeding. Breeds in rains: mainly Jun-Sept in N India, practically all year in peninsular India and Sri Lanka (peak Mar-Apr, Sri Lanka), from Apr in Myanmar, nests with eggs Jan-May in Peninsular Malaysia. Monogamous, occurs in pairs. Nest a large globular ball of twigs and leaves, or coarse grass, with lateral entrance, concealed in thick bush or low in thorny tree or in rice fields. Eggs 2-4 (India), 2-3 (Sri Lanka), 2 (Malaysia), chalky white, stained by nest dirt; 36 x 28 mm (India), 34 x 29 mm (Sri Lanka), 38 x 30 mm (Java), 29 x 24 mm (N Borneo). Both sexes raise the young.
Movements. Resident. Occasionally disperses; one heard once on Serfung, Krakatau, in 1919, years after volcanic activity exterminated all landbirds. Flight slow and laboured, alternates flaps and glides.
Status and Conservation. Not globally threatened. Common almost everywhere throughout its expansive range, and very common in some areas, notably in much of India and Thailand. In Borneo, nestling coucals are taken by man for purported medicinal purposes.
Bibliography. Abdulali (1956, 1971), Ali & Ripley (1981), Ali & Whistler (1937), Biswas (1960), Büttikofer (1901), Deignan (1945), Dhindsa & Toor (1981), Dickinson *et al.* (1991), Etchécopar & Hüe (1978), Fernando (1968), Harvey (1990), Hellebrekers & Hoogerwerf (1967), Hoogerwerf (1964b), Johnsingh (1975), Khajuria (1984), Legge (1880), Lekagul & Round (1991), Li Xiaohui *et al.* (1983), Lin Lùhe (1966), MacKinnon & Phillips (1993), Madoc (1976), Majumdar *et al.* (1992), van Marle & Voous (1988), Medway & Wells (1976), Mukherjee (1995), O’Hanlon (1984), Phillips (1978), Ripley (1942, 1982), Roberts, T.J. (1991), Robinson *et al.* (1924), Rutgers & Norris (1972), Shelford (1900), Simmonds (1981), Smythies (1981, 1986), Sody (1989), Stepanyan (1995), Thewlis *et al.* (1996), Thornton (1996).

93. Brown Coucal

Centropus andamanensis

French: Coucal des Andaman **German:** Andamanenkuckuck **Spanish:** Cucal de Andamán
Other common names: Andaman Coucal



Taxonomy. *Centropus andamanensis* Beavan, 1867, Andaman Islands. Forms superspecies with *C. sinensis*, with which sometimes treated as conspecific. Species name sometimes erroneously given as *andamenensis*. Monotypic.
Distribution. Andaman Is, and neighbouring Table I, Great Coco I, Little Coco I (Myanmar).
Descriptive notes. 45-48 cm; 234 g. Adult grey-buff on head, mantle and underparts, back rufous-purple, wings rufous-purple with tip darker bronze, wing-linings grey-buff, tail bronzy-purple; iris red to red-brown to yellow, bill black, feet black. Female larger. Plumage

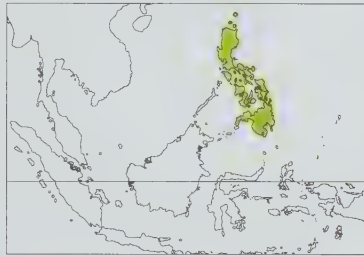
like pale morph of *C. sinensis kangeanensis*, but darker, belly more dusky or sooty. Juvenile finely barred above and below. Voice. A deep “boom, boom, boom”.
Habitat. Forests, cultivations, especially sugarcane, paddyfields, mangrove swamps.
Food and Feeding. Grasshoppers, presumably also other insects and small arthropods.
Breeding. Breeds Feb-Jul. Nest a dome of twigs, grass and leaves. Eggs 2-3, chalky white; 35 x 28 mm.
Movements. Resident.
Status and Conservation. Not globally threatened. Currently considered near-threatened. Restricted distribution, but within this area species is common, and is the most readily seen endemic bird in the Andaman Is.
Bibliography. Ali & Ripley (1981), Collar *et al.* (1994), Ripley (1982), Ripley & Beehler (1989), Tikader (1984).

94. Philippine Coucal

Centropus viridis

French: Coucal vert **German:** Grünkuckuck **Spanish:** Cucal Filipino
Other common names: Green Coucal

Taxonomy. *Cuculus viridis* Scopoli, 1786, Antigua, Panay. Four subspecies recognized.
Subspecies and Distribution.
C. v. major Parkes & Niles, 1988 - Babuyan Is (N Philippines).
C. v. viridis (Scopoli, 1786) - Luzon, Mindanao, Masbate, Bohol, Negros, Cebu, Leyte, Samar and Catanduanes (N & E Philippines).
C. v. mindoroensis (Steere, 1890) - Mindoro and Semirara Is (NC Philippines).
C. v. carpenteri Mearns, 1907 - Batan group (E Philippines).



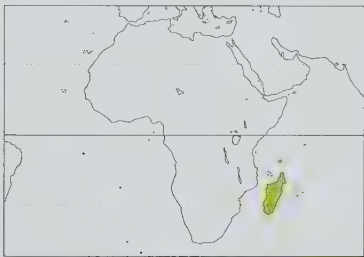
Descriptive notes. 41-43 cm; male 113 g, female 150 g (*viridis*), male 149 g, female 209 g (*carpenteri*), male 162 g, female 218 g (*major*). Adult *viridis* black above and below, glossed blue to green, wings chestnut; bare skin around eye grey, iris red, bill grey to black; also an uncommon white morph in Luzon, with dull yellowish bill. Female larger. Juvenile black or blackish above, streaked buff, wings chestnut, barred blackish, long tail unbarred bronze-green (tip sometimes barred), rectrices narrow, underparts black with narrow buff bars. 1st-winter plumage with head rufous-grey with light buff shaft streaks, wings rufous to vinaceous, underparts grey, upper breast streaked, and (especially) throat pale with buff shaft streaks, tail bronze-green, below mottled grey. Race *major* larger; *mindoroensis* and larger *carpenteri* melanistic, with blackish wings. Voice. “cuc, cuc, ...” or “Cha-gook-chook”.
Habitat. Tall grass, mixed cultivation, disturbed second growth, thickets, from lowlands up to 2000 m.
Food and Feeding. Insects, including beetles and caterpillars. Usually feeds on or near the ground.
Breeding. Breeding records Apr-Jul. Nest a bulky globe of grass, entrance on one side, in bed of giant grass, c. 1-1.5 m above ground. Eggs 3, dull white and chalky; 31-24 x 25-21 mm; incubation c. 2 weeks; chick has dark skin.
Movements. Resident.
Status and Conservation. Not globally threatened. Common within its range, and evidently adaptable; its ability to accept man-altered habitats is clearly an advantage in terms of its continued survival.
Bibliography. Alcalá & Alviola (1970), Alcalá & Sanguila (1969), Brooks, Dutson *et al.* (1995), Danielsen *et al.* (1994), Delacour & Mayr (1946), Dickinson *et al.* (1991), DuPont (1971), DuPont & Rabor (1973b), Gilliard (1950b), Goodman & Gonzales (1990), Goodman *et al.* (1995), Hachisuka (1934), Mees (1971), Parkes (1957b, 1965b, 1973), Parkes & Niles (1988), Potter (1953), Rabor (1977), Rand & Rabor (1960), Ross & Ramos (1992), Wolfe (1938).

95. Madagascar Coucal

Centropus toulou

French: Coucal toulou **German:** Tulukuckuck **Spanish:** Cucal Malgache
Other common names: Malagasy Coucal, Black Coucal

Taxonomy. *Cuculus Toulou* P. L. S. Müller, 1776, Madagascar. Sometimes regarded as conspecific with *C. grillii*, but voices of the two differ; also occasionally considered to include *C. bengalensis*. Extinct population of Assumption I sometimes awarded separate race, *assumptionis*. Two subspecies normally recognized.
Subspecies and Distribution.
C. t. toulou (P. L. S. Müller, 1776) - Madagascar.
C. t. insularis Ridgway, 1894 - Aldabra; formerly also Assumption I.



call, also a sudden guttural “coogoo”.

Descriptive notes. 40-46 cm; male 139 g, female 189 g (*toulou*), male 117 g, female 131 g (*insularis*). Adult black, but for unbarred rufous-chestnut middle and lower back and wings, tail glossy black, iris red, bill black, feet grey. Non-breeding plumage striped tan above, black areas with buffy shaft streaks, wings unbarred, bill rose-brown. Juvenile similar to non-breeding adult, more barred above and with short shaft streaks, wings and tail barred, belly slightly barred and with shaft streaks. Race *insularis* paler below in non-breeding plumage. Voice. Muffled “toogoo toogoo toogoo...”, decreasing in volume, duets; a “water-bottle”

Habitat. Dense vegetation or underbrush in forest, primary forest, recent clearings, second growth, eucalyptus woodlands, littoral forest, palms, mangroves, marshy reedbeds and grass, gardens. Sea-level to 1800 m.

Food and Feeding. Invertebrates, large insects (beetles, grasshoppers, caterpillars), spiders, lizards, rats, chicks and eggs. Feeds on ground, in thick scrub, chases grasshoppers and lizards in a tactic of "flush and rush"; rips bark from trees to get at lizards concealed behind; often feeds in pairs, one bird defending against theft of food by Crested Drongos (*Dicrurus forficatus*).

Breeding. Adults in breeding plumage Jul-Sept; nesting records Sept-Mar. Nest a large domed sphere, woven from dry grass, 1-4 m above ground in dense bush. Eggs 2-3 (Madagascar), 2 (Aldabra), smooth, white; 33 x 26 mm; highly variable in size and shape. Male attends nest. Older nestling, when feathered, has short pale shaft streaks.

Movements. Resident.

Status and Conservation. Not globally threatened. Widespread and fairly common in Madagascar, except on the denuded central plateau; estimated population of several hundred birds in Aldabra Is, where rather tame. Now extinct on Assumption I, a consequence of the mining of bird guano and the consequent destruction of soil and vegetation.

Bibliography. Bangs (1918), Benson (1967, 1981), Benson & Penny (1971), Benson *et al.* (1976-1977), Dee (1986), Delacour (1930, 1932a, 1932c), Dowsett & Dowsett-Lemaire (1993), Dowsett & Forbes-Watson (1993), Frith (1975), Kaudern (1922), Langrand (1990), Lippens & Wille (1976), Milon *et al.* (1973), Parkes (1957a), Pidgeon & O'Connor (1985), Pringle (1985), Prys-Jones & Diamond (1984), Rand (1936), Salvan (1972b), Snow (1978), van Someren (1947), Steinbacher (1972), Stoddart (1984), Werding (1972), Wilmé *et al.* (1997), Woodell (1976a, 1976b), Young, G. (1995).

96. African Black Coucal

Centropus grillii

French: Coucal noir

German: Grillkuckuck

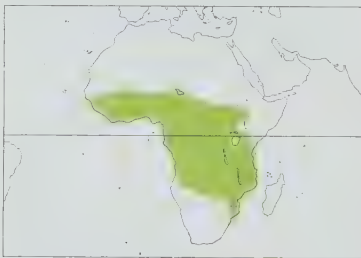
Spanish: Cucal Negro

Other common names: Black/Black-chested Coucal

Taxonomy. *Centropus Grillii* Hartlaub, 1861, Gabon.

Sometimes regarded as conspecific with *C. toulou*, but voices of the two differ; has also been considered possibly conspecific with *C. bengalensis*, but their ranges are highly disjunct and, again, vocalizations apparently differ. Monotypic.

Distribution. Senegal, Gambia and Ivory Coast through N Cameroon and Gabon to Ethiopia and Kenya, and S through S & E Zaire to Angola, Zambia, Malawi, N Zimbabwe, Mozambique and NE South Africa (NE Natal).



Descriptive notes. Male 30 cm, 100 g; female 34 cm, 151 g. Adult black with rufous wings, tail glossy black, iris dark brown, bill black, feet black. Non-breeding plumage dark brown above, barred rufous, streaked tawny and black from forehead to scapulars, buff below, bill brown above, pale blue-grey below, feet blackish. Female larger. Subadult, both plumages, wings and tail partly barred. Juvenile similar to non-breeding adult, but fully barred above, on tail and on belly, rump and uppertail-coverts black with narrow buff bars, iris pale grey, bill dark brown above, pale horn below, feet blue grey. **VOICE.** A double note repeated at 2-sec intervals, "kuk kuk"

or "ko-kop", also "hoo - hoo" at 1-sec intervals; song a descending "water-bottle" series of hoots, higher-pitched than in other coucals and not rising at end; alarm a clucking "tuk tuk".

Habitat. Tall rank grass and reedbeds, grassland near freshwater swamps, especially in wide grassy river valleys and marshes, and in seasonally flooded grasslands; not present in estuarine or tidal marshes.

Food and Feeding. Insects, especially grasshoppers, also beetles; spiders, mantids, small reptiles, seeds.

Breeding. Breeds during rains when grass is high, Apr-Jul in coastal Ghana, Jul-Aug in N Ghana and N Nigeria, Dec-Feb in N Tanzania (Serengeti, Mkomazi), Dec-Mar in Zimbabwe, Jan-May in Malawi. Female may be polyandrous (1 female observed with 3 males, each male tended a nest). Male feeds the female at copulation. Nest, built by male, an oval ball of dry grass and sedge, lined with leaves, concealed in grass or sedge 20-40 cm above ground. Eggs 3-6, white, laid at irregular intervals up to 9 days; 31 x 24 mm. Male incubates, and provides all the care of the young. Incubation from first egg; hatchling black, with long white hair-like down above, bill black with white egg tooth; fledges at 18-20 days, flies at 28 days. Female may lay several clutches in a season.

Movements. Resident in areas with permanent fresh water; other populations migrate into low-rainfall grasslands in rainy season. Uncommon sporadic and seasonal migrant in summer in S Africa in Kruger National Park and NE Natal. Seasonal with the rains in Aug-Oct in Middle River region in Gambia and at Prufu Swamp in Upper River region, and occurs in both wet and dry seasons on upper R Niger in Mali. Seasonal migrant in Ghana, where occurs in S May-Aug and in wetlands in N in the wet season Jul-Sept, though considered resident at Mole National Park; and in Togo, where present in the more humid S in dry season (Nov-Jul), and in N only in wet season (Jul-Aug), when in breeding plumage; no evidence of migration in Sierra Leone. Resident in S Nigeria; seasonal Apr-Oct during the rains in N Nigeria, and in the dry months Jan-Feb in Gabon.

Status and Conservation. Not globally threatened. Patchily distributed and generally scarce over its entire range, but can be common in suitable habitat locally, e.g. not uncommon in suitable habitat virtually throughout Sierra Leone. Seasonal disappearance of waters after rains and during the dry season is an important factor in its local population status.

Bibliography. Andersson (1995), Bannerman (1933, 1953), Benson & Benson (1977), Benson *et al.* (1971), Britton (1980a), Brooke (1984a), Brosset & Erard (1986), Cave & Macdonald (1955), Chapin (1939), Cheke & Walsh (1996), Clancey (1985), Dowsett & Dowsett-Lemaire (1980, 1993), Dowsett & Forbes-Watson (1993), Elgood, Fry & Dowsett (1973), Elgood, Heigham *et al.* (1994), Evans & Balmford (1992), Fry *et al.* (1988), Ginn *et al.* (1989), Giraudoux *et al.* (1988), Gore (1990), Greig-Smith (1976), Grimes (1987), Holman (1947), Irwin (1962), Lamiarche (1980), Lewis & Pomeroy (1989), Lippens & Wille (1976), Mackworth-Praed & Grant (1957, 1962, 1970), Maclean (1993), Nikolaus (1987), Parkes (1957a), Penny (1994), Pinto (1983), Rand *et al.* (1959), Rowan (1983), Rutgers & Norris (1972), Short *et al.* (1990), Snow (1978), Symmes (1960), Vernon (1971a, 1975), Vincent (1946), Wachter *et al.* (1997), Zimmerman *et al.* (1996).

97. Lesser Coucal

Centropus bengalensis

French: Coucal rufin

German: Bengalenkuckuck

Spanish: Cucal Bengali

Other common names: Small Coucal

Taxonomy. *Cuculus bengalensis* J. F. Gmelin, 1788, Bengal.

Has been considered possibly conspecific with *C. grillii*, but the ranges of the two forms are highly disjunct and their vocalizations appear to differ; also lumped with *C. toulou* in past. Five subspecies recognized.

Subspecies and Distribution.

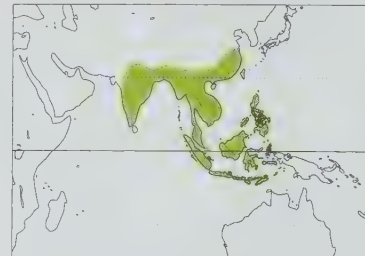
C. b. bengalensis (J. F. Gmelin, 1788) - India and Nepal through Bangladesh, Myanmar and Thailand to Indochina.

C. b. lignator Swinhoe, 1861 - S & SE China, Hainan and Taiwan.

C. b. javanensis (Dumont, 1818) - Malay Peninsula through Sumatra, Riau and Lingga archipelago, Bangka and Belitung to Java, Bali, Borneo and Philippines.

C. b. sarasinorum Stresemann, 1912 - Sulawesi and Lesser Sundas.

C. b. medius Bonaparte, 1850 - Moluccas.



Descriptive notes. Male 31 cm (India), 34 cm and 88 g (Philippines); female 34 cm (India), 38 cm and 152 g (Philippines). Adult black above and below, often with pale streaking, wings pale rufous brown, tail glossy black narrowly tipped whitish, iris red to brown, bill black, legs black. Non-breeding plumage barred brown above, rufous-white with dusky bars below. Female larger. Juvenile dark brown above, all barred light rufous, streaked rufous on head and back, shaft streaks buffy-white, whitish buff below with paler shaft streaks, belly barred, undertail buff-barred black, iris brown. Races differ mostly in size; *sarasinorum* larger and darker than *bengalensis*, *medius* larger still. **VOICE.** In India, double series of notes, "whoot, whoot", repeated, then series of "kurook, kurook, kurook", increasing in tempo and descending in pitch. In Greater Sundas, deep hollow "hoop" notes, accelerating and descending, more rapid than in *C. sinensis*. In Java, 3-4 hollow notes breaking into staccato, "boob, boob, boob, kok-ok-oo, kok-ok-oo, kok-ok-oo", also 4 or 5 "whoop" notes that increase in tempo and fall in pitch. In Sulawesi, series of hollow "booh-booh..." breaking into a tinkling cadence.

Habitat. Tall grass, reedbeds, swamps and marshlands, bamboo thickets, second-growth forest, open-country scrub and cultivation. Generally in more open habitats than those preferred by *C. sinensis*. Lowland floodplains and lower valleys, to 1800 m.

Food and Feeding. Insects, including grasshoppers (Acrididae), locusts, crickets, mantids, beetles, Hemiptera, hairy caterpillars, also spiders, lizards (*Calotes*); fruit. Forages mostly on ground.

Breeding. Breeds in India after onset of rains in Jun, nests May-Sept; in Myanmar nests in the rains, in Malay Peninsula nests Dec-Jul, in Philippines in Jul. Nest, built by both sexes, domed and oval-shaped, with lateral entrance hole, of twigs, grass and leaves, lined with green leaves, near ground in dense vegetation. Eggs 2-4, chalky white; 28 x 24 mm (India), 30 x 24 mm (Java). Both sexes incubate and tend the young.

Movements. Resident. Perhaps only a summer visitor locally, e.g. in Nepal.

Status and Conservation. Not globally threatened. A common resident of open country, if somewhat local in some areas. Rapidly colonizes new habitat where forests are cleared, appearing up to 8 km from nearest suitable habitat within 3-5 years. On Krakatau, after the eruption and devastation of all animal life in 1883, this species colonized the island by 1908, after a flight of at least 15 km over open water. The larger potential competitor *C. sinensis* was heard once on Krakatau (on Sertung), in 1919, by which time present species had already established itself in open country.

Bibliography. Ali & Ripley (1981), Ali & Whistler (1937), Ali *et al.* (1996), Biswas (1960), Cheng Tsohsin (1987), Coates & Bishop (1997), Deignan (1945), Dickinson, Kennedy & Parkes (1991), Dickinson, Kennedy, Read & Rozendaal (1989), Échécopar & Hüe (1978), Harvey (1990), Hellebrekers & Hoogerwerf (1967), Hoogerwerf (1964b), Lekagul & Round (1991), Li Xiaohui *et al.* (1983), MacKinnon & Phillips (1993), Madoc (1976), van Marle & Voous (1988), Medway & Wells (1976), Mees (1971, 1986), Parkes (1957a), Rabor (1977), Ripley (1982), Rutgers & Norris (1972), Smythies (1981, 1986), Sody (1989), Spennemann (1928), Stepanyan (1995), Stresemann (1912, 1913a), Thornton (1996), Watling (1983), Wells & Medway (1976), White & Bruce (1986).

98. Green-billed Coucal

Centropus chlororhynchus

French: Coucal de Ceylan

German: Ceylonkuckuck

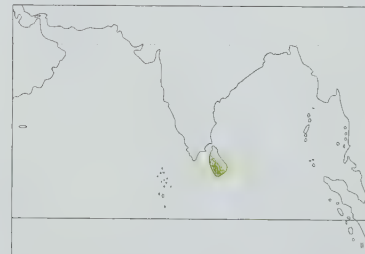
Spanish: Cucal de Ceilán

Other common names: Sri Lanka Green-billed/Ceylon Coucal

Taxonomy. *Centropus chlororhynchus* Blyth, 1849, Sri Lanka.

Monotypic.

Distribution. Sri Lanka.



Descriptive notes. 43-46 cm. Adult dull black on head, body and tail, neck and tail glossed purple, wings chestnut (darker than in sympatric *C. sinensis*), wing-linings black, iris red to reddish brown; bill ivory to pale green, feet black. Female larger. Juvenile as adult, but iris grey, bill greenish with dark grey base and culmen, feet dusky flesh colour. **VOICE.** Resonant deep "hoop-poop-poop", the last note lower in pitch; also a short 2-syllable "hu, hu", and a single-note "chewkk".

Habitat. Humid high evergreen forest with dense undergrowth, especially bamboo and rattan cane rushes in disturbed areas; occurs

in wet-zone forests W, SW & S of the C mountain massif. Low country to 800 m.

Food and Feeding. Omnivorous; takes termites. Feeds on ground and in trees and creepers.

Breeding. Breeds mainly May-Jul. Nest globe-shaped or domed, of twigs, roots and grass, lined with green leaves, built near ground. Eggs 2-3, chalky white; 35 x 27 mm.

Movements. Resident.

Status and Conservation. **ENDANGERED.** A rare, local and declining species, endangered by the continued loss of its forest habitat to agriculture. Its total population is estimated at no more than a few hundred pairs, and it appears to be most secure on the lower edge of Peak Wilderness Sanctuary in Sinharaja National Heritage Wilderness Area, Ratnapura District.

Bibliography. Ali & Ripley (1981), Collar & Andrew (1988), Collar *et al.* (1994), Henry (1971), Hoffmann (1984, 1989a, 1989b), Kotagama & Fernando (1994), Legge (1880), Phillips (1978), Ripley (1982), Wheatley (1996), Wijesinghe (1994).

99. Black-throated Coucal

Centropus leucogaster

French: Coucal à ventre blanc **German:** Weißbauchkuckuck **Spanish:** Cucal Ventri blanco
Other common names: Great Coucal(!)

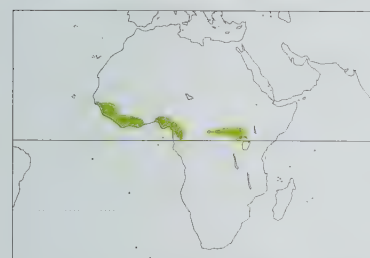
Taxonomy. *Polophilus leucogaster* Leach, 1814, New Holland; error = Ghana. Range complementary to that of *C. anelli*, suggesting that the two may be allopecies. Race *neumanni* of Zaire has been considered to be more closely related to *C. anelli*, and perhaps even a distinct species, based mainly on size; size overlap occurs, but evidence unclear as sexes of specimens were not indicated. Three subspecies recognized.

Subspecies and Distribution.

C. l. leucogaster (Leach, 1814) - S Senegal and Guinea-Bissau E to SE Nigeria.

C. l. efulensis Sharpe, 1904 - SW Cameroon and Gabon.

C. l. neumanni Alexander, 1908 - NE Zaire.



Descriptive notes. 46-58 cm; male 293 g, female 336 g. One of largest of African coucals. Adult black above and from head to breast; back barred buff, tail glossed blue, wings rufous-chestnut darker at tips; belly white with creamy wash on flanks; iris red, bill black, feet black to blue-grey. Juvenile like adult, but lacks gloss on head and breast, head, throat and breast with short buff shaft streaks, wings barred brown, belly buffy, tail more barred. Iris grey or reddish brown, lower mandible horn. Race *leucogaster* glossed violet-blue; *efulensis* with blackish inner secondaries; *neumanni* as *efulensis* but smaller. **Voice.** Song deep, bub-

bling, 10-20 notes slowing in tempo and falling in pitch, middle notes well spaced, final ones rising and speeding, in a "water-bottle" phrase; calls at night.

Habitat. Dense undergrowth in forest edge, forest remnants, secondary forest, thickets, dense grass, especially along streams and at margins of raphia swamps, etc.; more numerous in heavy gallery forest and thick second growth than in primary forest. Lowland forest zone.

Food and Feeding. Insects, including caterpillars, spiders, beetles, grasshoppers; also snails and frogs. Feeds on or near ground.

Breeding. Breeds Dec in Sierra Leone, Nov in Liberia, Aug in Ghana, Jun-Nov in Cameroon, Mar-Dec in Uelle region of N Zaire. Nest a large ball of leaves and grass, lined with green leaves, up to 30 cm above ground in bush, in forest or in long grass. Eggs 2, white, elliptical; 38 x 28 mm. Nestling with dense white hair-like down above.

Movements. Resident.

Status and Conservation. Not globally threatened. Fairly common in forests of lower Casamance in S Senegal; common in forest habitat in Nigeria, though rarely seen because of its skulking habits; in Sierra Leone, not uncommon in lowland forests and in suitable habitat in areas formerly covered by forest. Has been observed in Monts Mandingues in SW Mali; uncommon in Ghana, rare in Togo. **Bibliography.** Bannerman (1933, 1953), Chapin (1939), Cheke & Walsh (1996), Colston & Curry-Lindahl (1986), Demey & Fishpool (1994), Dowsett & Dowsett-Lemaire (1993), Dowsett & Forbes-Watson (1993), Elgood *et al.* (1994), Fry *et al.* (1988), Grimes (1987), Helsens (1996), Lamarche (1980), Lippens & Wille (1976), Louette (1981, 1986), Mackworth-Præd & Grant (1970), Morel & Morel (1990), Rutgers & Norris (1972), Serle (1957), Snow (1978), Thiollay (1985), White (1965).

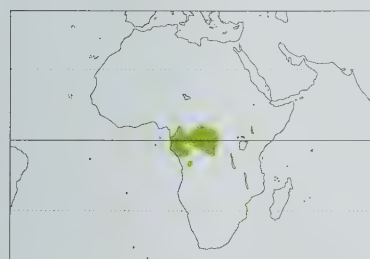
100. Gabon Coucal

Centropus anelli

French: Coucal de Gabon **German:** Anellkuckuck **Spanish:** Cucal de Gabón

Taxonomy. *Centropus anelli* Sharpe, 1874, Danger River, Gabon. Range complementary to that of *C. leucogaster*, suggesting that the two may be allopecies. Form *C. leucogaster neumanni* of NE Zaire has been considered more closely related to present species, and may even be a distinct species. Monotypic.

Distribution. S Cameroon and Gabon to NW Angola and C Zaire.



Descriptive notes. 46-58 cm; male 210 g. Adult purplish-glossed black above and on head; lower back buff, barred black; tail blackish bronze, wings rufous with darker tips; below rich tawny; iris red, bill black, feet black. Female larger; iris reddish brown. Juvenile dark brown above, head with pale shaft streaks, forehead buff (not black), wing black-barred rufous, tail black, barred buff, underparts rufous-buff, finely barred black, centre of belly unbarred buffy; iris grey-brown, bill dark grey above, greenish grey below, feet slate. **Voice.** Song 9-12 descending loud, deep notes delivered with head lowered and throat puffed out; another call a melancholy bass "ouh ouh ouh ouh..."; pairs call in duet.

Habitat. Primary forests, undergrowth in swampy forests, second growth, old cultivations, grassy swamps.

Food and Feeding. Omnivorous; diet includes insects (grasshoppers, katydids, beetles), molluscs, frogs, small snakes, small birds. Feeds mainly on or near ground; scavenges around camps and villages.

Breeding. Breeding begins with rains or in little dry season in wettest forest region: lays Dec-Feb in NE Gabon, young in Nov in Uelle, Mar in Angola. No information on nest, eggs or young.

Movements. Resident.

Status and Conservation. Not globally threatened. Fairly common to common, but difficult to observe. Population density 3-5 pairs/100 ha in Gabon, where its territories are mutually exclusive with those of *C. monachus*, the most closely related species at the same locality.

Bibliography. Bannerman (1933, 1953), Brosset & Énard (1986), Chapin (1939), Christy & Clarke (1994), Dowsett (1989), Dowsett & Dowsett-Lemaire (1993), Dowsett & Forbes-Watson (1993), Fry *et al.* (1988), Green & Carroll (1991), Irwin (1985), Lippens & Wille (1976), Louette (1981, 1986), Mackworth-Præd & Grant (1962, 1970), Pinto (1983), Snow (1978).

101. Blue-headed Coucal

Centropus monachus

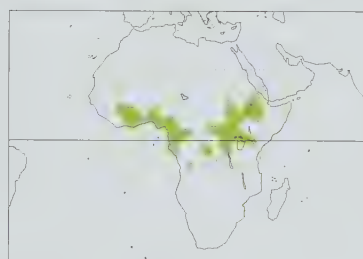
French: Coucal à nuque bleu **German:** Mönchskuckuck **Spanish:** Cucal Monje

Taxonomy. *Centropus monachus* Rüppell, 1837, Kulla, northern Ethiopia. Possible intermediates occur between present species and *C. cupreicaudus*, and their vocalizations are similar; on occasion treated as conspecific. Several additional races described appear invalid: form "heuglini" with a blue (not violet) head, found along large permanent swamps in Sudan, appears to represent an immature plumage of *fischeri*; a separate race, *occidentalis*, sometimes recognized for birds of Gabon, but probably indistinct from *fischeri*; birds from Shaba in SW Zaire, described as smaller race *verheyeni*, in fact overlap in size with *fischeri*. Two subspecies recognized.

Subspecies and Distribution.

C. m. fischeri Reichenow, 1887 - Ivory Coast and Ghana through S Nigeria, S Cameroon, Gabon, N Angola and Zaire to S Sudan, NW Tanzania and highlands of Ethiopia and W Kenya.

C. m. monachus Rüppell, 1837 - Ethiopia to C Kenya.



Descriptive notes. 45-52 cm; male 171 g, female 237 g. Adult blue-glossed black from forehead to upper back; lower back and wings reddish brown; rump, uppertail-coverts and tail unbarred black, tail with greenish or bronze gloss; whitish to pale buff below, darker on flanks; iris red, bill black, feet black. Female larger. Juvenile has crown and neck blackish with buff shaft streaks, wings barred blackish, tail (except central rectrices) barred, throat darker buff, belly pale buff. Race *fischeri* slightly smaller, back and wings slightly duller (more olive); juvenile darker above. **Voice.** Deep and resonant, "water-bottle" and "coo"

phrases slower and deeper than those of other coucals. Songs begin with 2 "coo" phrases, pairs often duet; also a barking note and a raucous cackle.

Habitat. Swamps, marshes, papyrus and river banks, forest edge, mesic savannas near water or forest, dense cover, secondary growth, edges of villages and along trails; occurs in wetter habitats than *C. senegalensis*. Lowlands to 2000 m and 2500 m in Kivu volcanos, and to 2000 m in Kenya, where within the 1000+ mm rainfall region.

Food and Feeding. A generalist carnivore, diet including insects (mainly grasshoppers and beetles), also snails, nesting birds, bird eggs, lizards, snakes, frogs, mice and rats. Skulks within cover; shy.

Breeding. Breeds Jun-Jul in Togo, Mar-Jun in Nigeria, Jan and Apr-Sept in Cameroon, Aug-Mar in NE Gabon, May-Nov in Uelle (N Zaire), Sept and Feb-Jun around L Victoria. Nest an oval mass of dry grass and sedge (or sticks and dry leaves), lined with green leaves, with side entrance, concealed in bushes or tall grass or a dense tree, placed c. 30 cm to 3 m above ground. Eggs 3, white, light gloss; 34.5 x 27 mm. Hatchling has black skin with long white down.

Movements. Resident.

Status and Conservation. Not globally threatened. Generally common within its range; common in village areas in NE Gabon, and very common around L Victoria and L Kyoga. Nominated *monachus* seems to be less numerous, at least in Kenya.

Bibliography. Bannerman (1933, 1953), Britton (1980a), Brosset & Énard (1986), Brown & Britton (1980), Cave & Macdonald (1955), Chapin (1939), Cheke & Walsh (1996), Christy & Clarke (1994), Dowsett & Forbes-Watson (1993), Elgood *et al.* (1994), van den Elzen & König (1983), Friedmann (1930a, 1966), Fry *et al.* (1988), Grimes (1987), Irwin (1985), Lewis & Pomeroy (1989), Lippens & Wille (1976), Louette (1986), Mackworth-Præd & Grant (1957, 1962, 1970), Millet-Horsin (1921), Nikolaus (1987), Pinto (1983), Ripley & Heinrich (1966a), Rutgers & Norris (1972), Short *et al.* (1990), Snow (1978), van Someren (1949), Traylor (1960), Zimmerman *et al.* (1996).

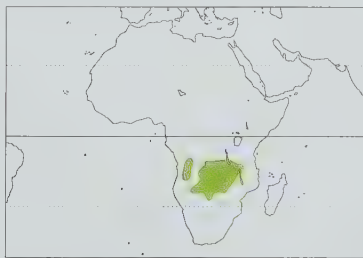
102. Coppery-tailed Coucal

Centropus cupreicaudus

French: Coucal des papyrus **German:** Kupferschwanzkuckuck **Spanish:** Cucal Colicobrizo

Taxonomy. *Centropus cupreicaudus* Reichenow, 1896, Okavangoland and south Angola. Has been treated as conspecific with the very similar *C. monachus*. Smaller and darker birds in N Malawi and S Tanzania have been described as separate race *songweensis*, but there is overlap in these traits with other populations. Monotypic.

Distribution. Angola through S Zaire and Zambia, by R Okavango and Caprivi Strip, E past Victoria Falls in Zimbabwe then N to Malawi and SW Tanzania.



Descriptive notes. 42-50 cm; male 272 g, female 299 g. Adult violet-glossed black from forehead to mantle; back and wings reddish brown; uppertail-coverts faintly barred, tail blackish brown with coppery gloss, underparts creamy white; iris red, deep bill black, feet black. Female larger. Juvenile less glossed, head with buff shaft streaks, tail barred, buff on breast. **Voice.** Series of 10-20 low-pitched, descending notes, in "water-bottle" pattern, similar to song of *C. monachus*, also low "cou...cou..." calls; pairs often duet.

Habitat. Swamps, marshes, river-bank vegetation, thickets, long grass. Lowlands to 1250 m.

Food and Feeding. Large insects, including grasshoppers, also snails, crabs, fish, frogs, snakes, lizards, small birds. Scavenges for dead fish; tears open bird nests to get at the young.

Breeding. Breeds Sept and Nov-Feb in Zambia, during rains. Nest a coarsely built dome of fresh grass and twigs, lined with leaves, with side entrance, low in reedbed. Eggs 2-4, white, little gloss; 38 x 26 mm. Hatchling has black skin with long white down.

Movements. Resident.

Status and Conservation. Not globally threatened. In general, a rather sparsely distributed bird; however, it is locally common, for instance in marshes along streams and rivers near upper R Zambezi.

Bibliography. Benson (1948), Benson & Benson (1977), Benson & Pitman (1964), Benson *et al.* (1971), Britton (1980a), Clancey (1985), Dowsett & Forbes-Watson (1993), Fry *et al.* (1988), Ginn *et al.* (1989), Irwin (1985), Lippens & Wille (1976), Louette (1986), Mackworth-Praed & Grant (1962, 1970), Maclean (1993), Penry (1994), Pinto (1983), Rowan (1983), Short *et al.* (1990), Snow (1978), Traylor (1960).

103. Senegal Coucal

Centropus senegalensis

French: Coucal du Sénégal **German:** Spornkuckuck **Spanish:** Cucal Senegalés
Other common names: Rufous-bellied Coucal ("epomidis")

Taxonomy. *Cuculus senegalensis* Linnaeus, 1766. Senegal.

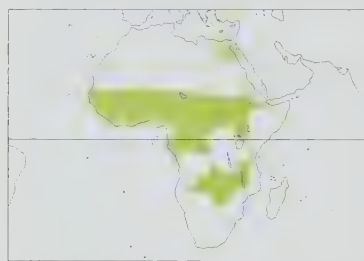
Darker rufous form "epomidis" of coastal Nigeria and also Ghana has sometimes been treated as a valid race, or even as a separate species, but interbreeds freely with white-bellied form of nominate *senegalensis*. Three subspecies recognized.

Subspecies and Distribution.

C. s. aegyptius (J. F. Gmelin, 1788) - Egypt, from R Nile S to El Minya.

C. s. senegalensis Linnaeus, 1766 - Senegal and Gambia E to Uganda, W Kenya, Eritrea and Somalia, and S to NW Angola, SC Zaire and L Victoria.

C. s. flecki Reichenow, 1893 - E Angola, NE Namibia and N Botswana E through S Zaire (Shaba), Zambia and Malawi to Zimbabwe and SW Tanzania.



Descriptive notes. 36-42 cm; male 169 g, female 171 g. Black glossed green above, from forehead to mantle; back and wings rusty-brown, rump unbarred black, tail blackish with green gloss; white below; iris red, bill black. Female slightly larger. Also occurs as dark rufous morph "epomidis" with chin, throat and breast dark brown to black, belly, flanks and undertail-coverts rufous. May have subadult plumage, lacking gloss on head and with black tail. Juvenile barred brown and blackish above, crown brown or grey, wings barred rusty and dark brown, primaries unbarred but dark at tips, tail blackish with faint buff barring at tip.

underparts buffy, barred blackish on flanks. Race *flecki* has blue gloss on head; *aegyptius* larger, sootier, less rufous above. **Voice.** Deep tooting notes, falling in pitch then rising at end, in "water-bottle" call like that of other coucals; pairs often duet; also a series of deep "coo" notes, a short hoot, and sharp "guk, guk" alarm call.

Habitat. Coarse grass, thickets in woodland, edge of reedbeds, dense riverine bush, scrub, sugarcane plantations, gardens, palm groves; less associated with wet areas than other African coucals. In SW Tanzania (near Mbeya), lives along borders of dry-forest belt and flies into crowns of tall trees, whereas *C. superciliosus* lives in scattered dense low scrub and cane on flats and on the shores of small rivers and occasionally visits low acacias.

Food and Feeding. Insects (grasshoppers, caterpillars, termites, beetles, bugs), frogs, small rodents, reptiles, birds, bird eggs and nestlings, snails. Forages mainly on ground, moving by slow stalking walk, changing to hop and run; feeds on escaping insects by edge of grass fires.

Breeding. Breeds during rains, while grass is pliant and high enough to provide nest material and cover: Mar-Aug in Egypt, May-Oct in N Senegal, Jul-Nov in Gambia, Mar-Aug in Nigeria, Apr-Aug in Ethiopia, Nov-May in Malawi; Sept-May in Sierra Leone, chiefly before and after main rains. Nest a ball of coarse dry grass, lined with green leaves, to 4 m above ground in bush. Eggs 2-5, white; 34 x 26 mm; incubation 18-19 days. Hatchling has skin black above, dark pink below, with long white hair-like down, gape pink, tongue red; cared for by both sexes, fledging 18-20 days, before capable of flight.

Movements. Resident in most of its range; locally migratory in more arid areas, as in N Mali and C Sudan (W Kordofan), where a wet-season visitor.

Status and Conservation. Not globally threatened. Common in much of its sizeable range, e.g. abundant throughout Sierra Leone except in high forest. Has expanded its range from beginning of 20th century in Egypt, where formerly more restricted to El Faiyum region, but now quite common in Cairo and Rosetta Nile, and more recently also in the Nile Delta and lower valley.

Bibliography. Anon. (1985a), Ash & Miskell (1983), Bannerman (1933, 1953), Benson & Benson (1977), Benson *et al.* (1971), Britton (1980a), Brosset & Éard (1986), Brotherton (1965), Cave & Macdonald (1955), Chapin (1939), Cheke & Walsh (1996), Colston & Curry-Lindahl (1986), Cramp (1985), Dowsett & Dowsett-Lemaire (1993), Dowsett & Forbes-Watson (1993), Elgood (1955, 1973), Elgood *et al.* (1994), Échécopar & Hùe (1964), Fry *et al.* (1988), Ginn *et al.* (1989), Giraudeau *et al.* (1988), Goodman *et al.* (1989), Gore (1990), Granvik (1923), Greaves (1937), Greig-Smith (1977), Grimes (1987), Irwin (1985), Jensen & Kirkeby (1980), Lamarche (1980), Lewis & Pomeroy (1989), Lippens & Wille (1976), Lorber (1984a), Louette (1986), Mackworth-Praed & Grant (1957, 1962, 1970), MacLaren (1950), Maclean (1993), Marquard & Bryan (1983), Moynihan (1978), Nikolaus (1987), Penry (1994), Pinto (1983), Ripley & Heinrich (1966b), Rowan (1983), Rutgers & Norris (1972), Serle (1950a), Short *et al.* (1990), Snow (1978), Steyn (1972), Zimmerman *et al.* (1996).

104. White-browed Coucal

Centropus superciliosus

French: Coucal à sourcils blancs **German:** Weißbrauenkuckuck **Spanish:** Cucal Cejiblanco
Other common names: Lark-heeled Cuckoo; Burchell's Coucal (*burchelli*)

Taxonomy. *Centropus superciliosus* Hemprich and Ehrenberg, 1833, Arabia and Ethiopia.

The form *burchelli* might be recognized as a full species, although intermediates, apparent hybrids between forms with a supercilium and forms without, are known in Zimbabwe, Zambia, Mozambique and N Malawi. The difference in plumage suggests that adults of N forms have retained a juvenile-like plumage (with white supercilium and brown crown and hindneck), while adults of S form *burchelli* have a glossy black head and neck derived from an additional terminal plumage following the streaked plumage in which some birds breed. Birds from E Zimbabwe and Mozambique to E Tanzania, named as race *fasciopygialis*, are probably a variant of *burchelli*. Four subspecies recognized.

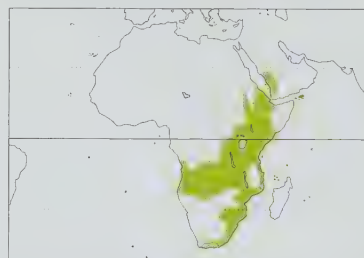
Subspecies and Distribution.

C. s. sokotrae C. H. B. Grant, 1915 - Socotra and SW Arabia (Tihama).

C. s. superciliosus Hemprich & Ehrenberg, 1833 - E Sudan, Ethiopia and W Somalia through Kenya and NE Uganda to NE Tanzania.

C. s. loandae C. H. B. Grant, 1915 - Uganda, SW Kenya and Tanzania through SE Zaire, N Malawi and Zambia to Angola, Botswana and N Zimbabwe.

C. s. burchelli Swainson, 1838 - E Botswana through S & E Zimbabwe and S Malawi to Mozambique and E Tanzania, and S to South Africa.



Descriptive notes. 36-42 cm; male 160 g, female 180 g. Adult has head dark brownish with broad white supercilium, mantle blackish, streaked whitish, back rufous-brown, rump finely barred black and buff, long heavy tail green-glossed black, wings chestnut; whitish below, breast with creamy yellowish to whitish hackles; iris red, bill black, feet black or bluish grey. Female larger. Juvenile streaked buff and brown on head and neck, buff supercilium, wings and tail barred rufous and blackish, underparts buff; iris red by time tail grown. Race *loandae* larger, crown blackish, upperparts darker and more reddish chestnut,

juvenile paler; *sokotrae* slightly paler and greyer, but not very distinct from nominate; *burchelli* has crown to mantle black, unstreaked and without supercilium, juvenile more rufous (also an immature plumage stage with pale buff supercilium, brown crown, blackish neck with straw-coloured streaks). **Voice.** Song a series of 10-20 notes, descending in pitch and increasing in tempo, like water gurgling from a narrow-necked bottle; pairs perform overlapping duet of "water-bottle" calls, one starting as the other completes its call. Also song of deep "coo" notes, falling and then rising in pitch, voice not so low as *C. anselli*; alarm a hiss and a "chuck".

Habitat. Riverside, dense bush, moist vegetation, tall rank grass, marshes, thickets, shrubby once-cultivated weedfields. Mostly lowland, also montane areas to 2200 m in bracken briar, even to 2800 m, and arid country.

Food and Feeding. Insects (mainly grasshoppers, crickets and locusts, beetles), spiders, snails, crabs, lizards, snakes, frogs, mice, small birds, including nestlings and eggs. Spends much time skulking in grass, bushes and other cover; forages at grass fires.

Breeding. Breeds Mar-Jun (mainly Apr-May) in Ethiopia, all months but mainly in wet seasons in Kenya (Apr-Jul and Aug in Ngong area), Dec-Feb in Zambia, Oct-Mar in Malawi, Sept-Feb in S Africa, Aug-Jan in SW Cape. Pairs are monogamous and territorial. Male feeds female a large insect at copulation. Nest a large untidy dome with side entrance, of grass and twigs, lined with leaves, at 0-10 m in reeds or bush. Eggs 3-5 (3-6), white; 34.5 x 26 mm; laying interval 24-48 h, sometimes a few days; incubation 14-15 days, from first egg, mainly by male; hatching asynchronous on different days. Hatchling has black skin with long white hair-like down, "like a spiny hedgehog"; young fed by both sexes, hiss and emit foul-smelling black cloacal liquid when disturbed. Fledging 18-20 days (14 days if disturbed); older young stay near nest until all are ready to leave, young barely able to fly at this stage, creep about quietly until parents arrive with food.

Movements. Resident.

Status and Conservation. Not globally threatened. Common in much of its range, and the commonest coucal in E Africa. Density of 1 pair every 0.5 km in marshy habitat in Transvaal. Generally avoided for human food, but coucals are sometimes eaten, and an observation of a chimpanzee (*Pan troglodytes*) eating this coucal suggests that the birds are probably not noxious in taste.

Bibliography. Ash & Miskell (1983), Bannerman (1953), Benson & Benson (1977), Benson *et al.* (1971), Britton (1980a), Brooke *et al.* (1990), Brown & Britton (1980), Cave & Macdonald (1955), Chapin (1939), Christy & Clarke (1994), Clancey (1964b, 1989a), Dowsett & Dowsett-Lemaire (1993), Dowsett & Forbes-Watson (1993), Evans, M.I. (1994), Evans, M.I. & Balmford (1992), Forsyth (1983), Frere (1984), Friedmann (1930a), Fry *et al.* (1988), Ginn *et al.* (1989), Hockey *et al.* (1989), Irwin (1985), Jennings (1981a, 1995), Lawson (1962), Lewis & Pomeroy (1989), Lippens & Wille (1976), Louette (1986), Mackworth-Praed & Grant (1957, 1962, 1970), Maclean (1993), McGill (1992), Nikolaus (1987), Pakenham (1979), Penry (1994), Pinto (1983), Porter *et al.* (1996), Rowan (1983), Rutgers & Norris (1972), Shak (1983), Short *et al.* (1990), Snow (1978), van Someren (1956), Zimmerman *et al.* (1996).



Subfamily COCCYZINAE

Genus *COCCYZUS* Vieillot, 1816

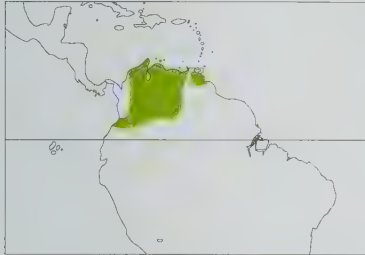
105. Dwarf Cuckoo

Coccyzus pumilus

French: Coulicou nain

German: Zwergkuckuck

Spanish: Cuclillo Enano

Taxonomy. *Coccyzus pumilus* Strickland, 1852, Trinidad; error = Venezuela.Forms a superspecies with *C. cinereus*. Monotypic.**Distribution.** Colombia (mainly on E slopes of Andes) through upper Orinoco Valley to NE Venezuela; recorded once in N Brazil (Roraima).**Descriptive notes.** 21 cm; 36 g. Adult brownish grey above, tail short, brownish grey with subterminal band black, white tip; throat and breast rufous merging to buff on flanks, abdomen white or buff; eye-ring red, iris red, bill black. Juvenile browner above, throat pearly-grey, eye-ring yellow, iris olive-brown. VOICE. Calls "churr", grating "trrr trrr trrr..."; dawn song "kööa kööa".**Habitat.** Tropical deciduous forest, gallery forest, secondary forest; open woodland, pastures with scattered trees, dry lowland scrub. Sea-level to 1000 m, occasionally to 2600 m near Bogotá, Colombia.**Food and Feeding.** Insects, especially caterpillars and treehopper nymphs, taken from trees, shrubs and ground.**Breeding.** Pair may nest all year. Monogamous, some polyandry (female mated with two males, both males helped rear young). Courtship feeding observed at all stages of nesting cycle. Nest a flimsy platform of twigs and vines in canopy of short tree. Eggs 2-3, dull white; 25 x 20 mm; two females may lay in a nest; incubation from first egg, by both sexes. Nestlings cared for by both sexes, fledge in 12 days. Nest success 56%; predation accounts for most of the nest losses.**Movements.** Resident, marked birds remaining on territory all year in Colombia; appearance is seasonal with the rains in Venezuelan savanna.**Status and Conservation.** Not globally threatened. Fairly common, and apparently secure for present. Has recently expanded its range into humid and wet regions where forests have been cleared for pasture.**Bibliography.** Dunning (1982), Fjeldså & Krabbe (1990), Friedmann (1948b), Hilty & Brown (1986), Kirwan (1996), Meyer de Schauensee (1982), Meyer de Schauensee & Phelps (1978), Naranjo (1982), Olrog (1968), Phelps & Phelps (1958), Ralph (1975), Short (1975), Sick (1985, 1993), Stotz *et al.* (1996), Thomas (1978, 1979), Whittaker (1995), Williams, R. (1995).

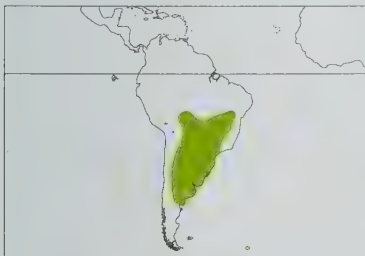
106. Ash-coloured Cuckoo

Coccyzus cinereus

French: Coulicou cendré

German: Grauehlnkuckuck

Spanish: Cuclillo Ceniciento

Taxonomy. *Coccyzus cinereus* Vieillot, 1817, Paraguay.Forms a superspecies with *C. pumilus*. Monotypic.**Distribution.** N & E Bolivia, Paraguay, Uruguay and N Argentina; also locally in C & S Brazil (Mato Grosso, Mato Grosso do Sul, Goiás, Bahia).**Descriptive notes.** 25 cm; 45 g. Adult brownish grey above, tail brown, ungraduated; white below, throat and breast buffy-grey, abdomen tinged buff, wing-linings pale buff, rectrices with narrow white tips below; eye-ring red, iris red, bill black, feet grey. Juvenile washed rufous above, tail brown with fine black bars near tip, no white tip, throat and breast greyish white. VOICE. A sonorous "cow-w cow-w cow", like *C. americanus* but without clucking at end.**Habitat.** Occupies variety of habitats including scrubby woodland, chaco scrub, tropical deciduous forest, gallery forest, riverine forest.

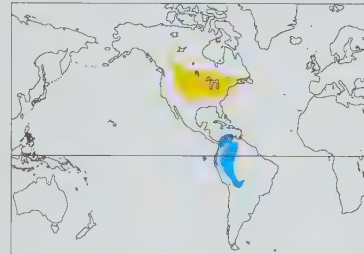
est. Lowlands to 900 m.

Food and Feeding. Insects.**Breeding.** Nest a flat oval platform of sticks and leaves, lined with leaves, in bush or tree. Eggs 2-4, white; 25.5 x 19 mm. Nestling mouth with white papillae, 5 on palate and 2 pairs around pharynx.**Movements.** Unknown; suspected seasonal austral migrant, perhaps migratory in extreme S. Records from E Peru, and possibly also from Colombia, indicate possible migratory movements or perhaps vagrancy.**Status and Conservation.** Not globally threatened. Little known about overall status, but species is considered generally uncommon throughout its variety of habitats in the lower tropical zone. Research required.**Bibliography.** Belton (1984), Canevari *et al.* (1991), Contreras (1979a), Contreras *et al.* (1990), Hayes (1995), Klimaitis & Moschione (1987), Narosky & di Giacomo (1993), Nellar (1993), Olrog (1968, 1984), de la Peña(1988), Pinto (1964), Remsen & Traylor (1989), do Rosário (1996), Schönwetter (1967), Short (1975), Sick (1985, 1993), Stotz *et al.* (1996), Straube & Bornschein (1995), Wetmore (1926).

107. Black-billed Cuckoo

Coccyzus erythrophthalmus

French: Coulicou à bec noir German: Schwarzschnabelkuckuck Spanish: Cuclillo Piquinegro

Taxonomy. *Cuculus erythrophthalmus* Wilson, 1811, near Philadelphia, Pennsylvania.Emendation of scientific name to "*erythrophthalmus*" is unjustified. Monotypic.**Distribution.** SC & SE Canada to SC & SE USA. Winters in NW & WC South America.**Descriptive notes.** 30 cm; male 47 g, female 54 g, heavier at migration. Adult brownish olive above, primaries brown, white below, long tail grey with narrow white tips below; eye-ring red, iris dark brown, bill black, feet dark grey. Juvenile with upperwing-coverts edged whitish or buff, buff wash on throat, sometimes rufous inner web of flight-feathers with dark leading edge, eye-ring grey (becoming buff to yellow in autumn), bill black above, grey below. VOICE. Rhythmic "cucucu, cucucu, cucucu" call begins with c. 5 notes, each on a lower pitch, then continued on same pitch, calls often grouped in staccato 2s and 3s. Silent on winter grounds.**Habitat.** High-ground forest, open woodland, thickets, willow (*Salix*), alder (*Alnus*), aspen (*Populus*), vines. On migration, occurs from tropical evergreen forest to arid subtropical scrub. Generally found from lowlands up to 2000 m.**Food and Feeding.** Insects, mainly caterpillars, also saw-flies, grasshoppers, crickets, beetles, spiders, phalangids; rarely frogs, small fish, eggs of other birds; berries especially in autumn. Feeds mainly in trees, and often on ground. Forages in tree foliage, cocks head, waits until insect moves, then grabs it. In winter joins mixed-species feeding flocks.**Breeding.** Breeds May-Sept; in Maryland May-Jul, in Oklahoma May-Jun. Courtship feeding occurs. Nest a shallow cup of sticks. Occasionally lays in nests of other individuals, also of *C. americanus* and other bird species. Eggs 2-5, light blue (darker than *C. americanus* eggs); 27 x 21 mm; incubation 10-11 days, from first egg, by both sexes, hatching asynchronous. Nestling has blackish skin with white sheathed down, mouth-lining reddish, ring of 5 white papillae on palate, 2 pairs elongate white papillae around pharynx, white papilla on tongue, feet blue; cared for by both parents, grow to 26 g at 6 days, fledging 8-14 days (first may fledge before last egg hatched in large clutches), fly at 21-24 days. Long nest attendance by adults, to 90 minutes.**Movements.** Migratory, moving at night through Mexico and Central America as late as Dec. Spring migration records at TV towers, where nocturnal migrants are killed, in Florida, Apr-May; autumn migrants late Aug to late Oct. Winters in W South America from Venezuela, Colombia, Ecuador and N Peru to Bolivia, from lowlands to 2800 m near Quito, Ecuador; accidental in N Argentina, Paraguay and Trinidad. Also transatlantic vagrant in autumn to W Europe.**Status and Conservation.** Not globally threatened. Breeding densities vary considerably across years, in apparent response to caterpillar outbreaks. Populations considered stable overall, and continent-wide numbers show no significant changes in period 1966-1993, with regional trends averaging insignificant annual variations of 1-1 % in W, 0-5 % in C, and 0-9 % in E.**Bibliography.** Agro (1994), Bent (1940), Berger (1952, 1954), Binford (1989), Canevari *et al.* (1991), Cramp (1985), Cyr (1995b), DeGraaf & Rappole (1995), Dod (1981), Dunning (1987), Fischer (1979), Fitzgerald (1995), Fjeldså & Krabbe (1990), Forbush (1927), Grocki & Johnston (1974), Harrison (1978), Herrick (1910), Hilty & Brown (1986), Howell & Webb (1995a), Johnsgard (1979), Kaufman (1996), Monroe (1968), Nolan (1975), Nolan & Thompson (1975), Parkes (1984), de la Peña (1988), Peterjohn *et al.* (1995), Peterson (1980), Price *et al.* (1995), Ridgely & Gwynne (1989), Roberts (1936), Robinson *et al.* (1995), Sealy (1978, 1985), Slud (1964), Spencer (1943), Stevenson & Anderson (1994), Stewart & Robbins (1958), Stiles & Skutch (1989), Stokes & Stokes (1996), Stotz *et al.* (1996), Sutton (1982), Terborgh *et al.* (1984), Thomas (1995), Trautman (1940), Wetmore (1968), Witter & Kulman (1972).

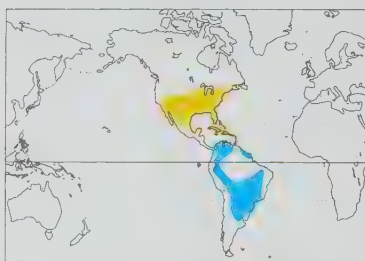
108. Yellow-billed Cuckoo

Coccyzus americanus

French: Coulicou à bec jaune German: Gelbschnabelkuckuck Spanish: Cuclillo Piquigualdo

Taxonomy. *Cuculus americanus* Linnaeus, 1758, South Carolina.Forms a superspecies with *C. euleri*. Birds in W North America average longer-winged and have been described as race *occidentalis*, but much overlap in size exists and most birds cannot be distinguished; "subspecies" records in non-breeding range are questionable. A claimed record of hybridization with *C. erythrophthalmus* refers to a juvenile *C. americanus*. Monotypic.**Distribution.** SE Canada and USA to Mexico (inland N Pacific slope, Baja California and Caribbean lowlands in Tamaulipas and Yucatán Peninsula) and N West Indies. Winters in South America.**Descriptive notes.** 30 cm; male 58 g, female 68 g, up to 110 g fat before migration, to 31 g after over-water migration. Adult brownish olive above, primaries rufous on inner webs, white below, long tail blackish with large white oval tips; eye-ring yellow to grey, iris dark brown, bill black above, yellow below, feet grey. Juvenile rectrices narrow, whitish tail spots large but indistinct, eye-ring grey, bill black above and grey below. VOICE. Rapid throaty "ka-ka-ka-ka-ka-ka-kow-kow-kow-kowlip", first notes loud and guttural, later ones slower and lower-pitched towards end; also a shorter knocking call, "ka-ka-ka", and soft repeated "coo"; call a single "kowlip".**Habitat.** High-ground forest with clear dark understorey, open woodland, shrubby pastures, riparian woodland, cottonwoods, willows (*Salix*), mesquite, thickets, tangles, and swamps. On migration, occurs from tropical evergreen forest and deciduous forest to arid scrub. In winter in Neotropics, occurs in gallery forest, tropical deciduous forest, secondary forest, occupying mainly woodland, scrub and bushy savanna in the lowlands; common on passage to 2800 m in Andes in Colombia and Ecuador, and migrants to 4200 m in Venezuela.

On following pages: 109. Pearly-breasted Cuckoo (*Coccyzus euleri*); 110. Mangrove Cuckoo (*Coccyzus minor*); 111. Cocos Cuckoo (*Coccyzus ferrugineus*); 112. Dark-billed Cuckoo (*Coccyzus melacoryphus*); 113. Grey-capped Cuckoo (*Coccyzus lansbergi*); 114. Cuban Lizard-cuckoo (*Saurothera merlini*); 115. Puerto Rican Lizard-cuckoo (*Saurothera vieillotii*); 116. Hispaniolan Lizard-cuckoo (*Saurothera longirostris*); 117. Jamaican Lizard-cuckoo (*Saurothera vetula*); 118. Chestnut-bellied Cuckoo (*Hyetornis pluvialis*); 119. Rufous-breasted Cuckoo (*Hyetornis rufigularis*).



Food and Feeding. Diet includes insects, mainly caterpillars, but also grasshoppers, katydids, crickets, cicadas and beetles; small lizards, especially *Anolis* in Caribbean, occasionally frogs; species takes eggs from bird nests; berries and fruit in summer and autumn. Forages in tree foliage, canopy and subcanopy; perches motionless, cocks head and waits until insect moves, then hops to grab it. Wintering birds join mixed-species flocks.

Breeding. Breeds May–Sept in E North America; Apr–Aug in Florida, May–Jul in Maryland, May–Sept in Ohio, May–Aug in Oklahoma, Mar–Sept in Texas; breeds May–Jul in Puerto Rico. Nest a platform of sticks, lined or not, near ground level to 30 m up in tree. Present species and *C. erythrophthalmus* sometimes lay in each other's nests and in nests of other birds. Occasionally more than one female lays in a nest. Eggs 3–5 (2–3 in Florida and Hispaniola), light blue; 30 x 23 mm; incubation 11 days (one report of 14 days), from first egg, by both sexes, hatching often asynchronous. Nestling has blackish skin with dusky grey sheathed down, mouth-lining reddish, ring of 5 white papillae on palate, 2 pairs elongate white papillae around pharynx, white papilla on tongue, feet blue-green; cared for by both sexes, fledging 8–9 days (total 18–21 days from incubation to fledging).

Movements. Migratory, at night. Over-water flight in autumn of 2000–3000 km to West Indies, from where it moves further S, or 4000-km direct flight from breeding range to mainland of South America; also migrates overland, where records in Panama Sept–Nov and Apr, rare in S Florida in winter; seasonal in Greater Antilles, where not seen Dec–Feb. Northbound migrants appear in Florida through May and into Jun, and possible southbound migrants begin to appear in kills at TV towers by Jul. On non-breeding islands southbound migrants appear by early Sept; in Netherlands Antilles, main autumn passage mid Oct to early Nov. Winters in South America E of Andes, from Colombia and Venezuela to Brazil (Mato Grosso), Uruguay and N Argentina; rare in Central America, and in the Guianas occurs mainly during passage periods (Oct, Nov, April). Remains in spring as late as early Jun in Surinam. Transatlantic vagrant in autumn to Greenland, W Europe, Morocco, Azores.

Status and Conservation. Not globally threatened. Breeding densities vary regionally across years, in apparent response to caterpillar outbreaks. Common in North America from the Great Plains eastward, with centres of density in S Great Plains (Oklahoma, E Texas, Louisiana). Scarce in W; has disappeared from riverine woodlands in California, Arizona and S Oregon with the loss of riparian woodland habitat. Results of linear transects reveal that numbers throughout North America have declined significantly in recent years (31% in period 1966–1993, 12% in 1984–1993). Broadly sympatric with *C. minor* in Hispaniola, Puerto Rico and Jamaica, and present all year round; occasional on S Bahama Is, with no breeding records.

Bibliography. Anderson & Laymon (1989), Banks (1988a, 1990), Bent (1940), Benton (1987), Berger (1952), Biaggi (1983), Binford (1989), Buden (1987), Canevari *et al.* (1991), Cracraft (1964), Cramp (1985), Cyr (1995c), DeGraaf & Rappole (1995), Dod (1981), Dunning (1987), Eaton (1979), Ehrlich *et al.* (1992), Fisk (1979), Fitzgerald (1995), Fjeldså & Krabbe (1990), Fleischer *et al.* (1985), Forbush (1927), Franzreb & Laymon (1993), Gaines (1974), Gaines & Laymon (1984), Gloger (1854), Grocki & Johnston (1974), Hamilton & Hamilton (1965), Harrison (1978), Haverschmidt & Mees (1994), Hendricks (1975), Hilty & Brown (1986), Howell & Webb (1995a), Iapichino & Massa (1989), Johnsgard (1979), Kaufman (1996), Kepler & Kepler (1978), Laymon & Halterman (1987), Mees (1970), Meyer de Schauensee & Phelps (1978), Monroe (1968), Naumburg (1930), Nolan (1975), Nolan & Thompson (1975), Oberholser (1974), Parkes (1984), de la Peña (1988), Peterjohn *et al.* (1995), Peterson (1980), Potter (1980, 1981), Preble (1957), Price *et al.* (1995), Ridgely & Gwynne (1989), Roberts (1936), Robinson *et al.* (1995), Rutgers & Norris (1972), Schaldach (1963), Sick (1985, 1993), Slud (1964), Small (1994), Snyder (1966), Stevenson & Anderson (1994), Stewart & Robbins (1958), Stiles & Skutch (1989), Stokes & Stokes (1996), Stotz *et al.* (1996), Sutton (1982), Terborgh *et al.* (1984), Thurber *et al.* (1987), Trautman (1940), Urban (1959), Van Tyne & Sutton (1937), Wetmore (1926, 1968), Wetmore & Swales (1931), Wiedenfeld *et al.* (1992), Wilbur (1987), Witter & Kulman (1972), Wolfe (1994).

109. Pearly-breasted Cuckoo

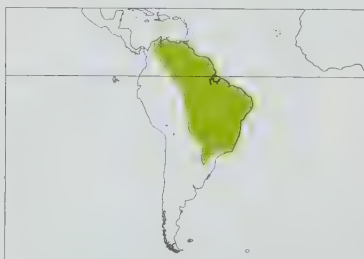
Coccyzus euleri

French: Coulicou d'Euler **German:** Perlbrustkuckuck **Spanish:** Cuclillo Ventriblanco

Taxonomy. *Coccyzus Euleri* Cabanis, 1873, Cantagallo, Rio de Janeiro, Brazil.

Forms a superspecies with *C. americanus*. Formerly known as *Coccyzus julieni* but this name officially suppressed. Monotypic.

Distribution. NE Colombia and the Guianas through Amazonia to E Brazil (Mato Grosso, Paraná, Rio de Janeiro, São Paulo) S to N Argentina (Misiones). Distribution patterns and movements unclear, but may only be winter visitor to E Colombia, Venezuela (R Orinoco) and the Guianas.



Descriptive notes. 28 cm; 61 g. Adult uniform earth-brown above, light pearly-grey below, centre of belly whitish, long tail blackish with white tips, no rufous on wing, inner webs of primaries white (brown in *C. americanus*); eye-ring grey to black, iris brown to black, bill black above, mostly yellow or orange below, feet grey to bluish grey. Juvenile has wings rufous. VOICE. Slow series of “kuouup” notes, 1/sec; also short rattle followed by 4–9 accented notes as in *C. americanus*, “tuctuctuctuctuct towlp, towlp, towlp towlp”.

Habitat. Tropical lowland evergreen forest, gallery forest, secondary forest; sandy wood-

land, scrub. Sea-level to 900 m.

Food and Feeding. Insects, mainly caterpillars.

Breeding. Very little known. Breeding record in Oct in Roraima (N Brazil). Nest undescribed. Eggs 2 (post-ovulatory follicles).

Movements. An austral migrant. Known to be present on breeding grounds during the austral summer, and in the Guianas and Venezuela during the austral winter; however, limits of breeding and non-breeding distributions have not been ascertained, patterns of movement are unclear, and paucity of records in N of range means that firm conclusions can not yet be made. Recorded once in Leeward Is (Sombbrero I).

Status and Conservation. Not globally threatened. Generally rare; only 3 records in Surinam, where it is thought to be a migrant, and uncommon in Brazil, where it breeds S of the Amazon. Distribution of species is poorly known, and confusion with *C. americanus* makes reported observations difficult to assess. Further research is required.

Bibliography. Banks (1988b), Banks & Bock (1991), Canevari *et al.* (1991), Contreras *et al.* (1990), Dubs (1992), Haverschmidt & Mees (1994), Hilty & Brown (1986), Meyer de Schauensee & Phelps (1978), Olog (1968), Partridge (1961), de la Peña (1988), Phelps & Phelps (1958), Remsen & T aylor (1989), Remsen *et al.* (1986), Sick (1985, 1993), Snyder (1966), Stotz *et al.* (1996), Straube & Bornschein (1995), Tostain *et al.* (1992), Tubbs (1992), Willis & Oniki (1990, 1991).

110. Mangrove Cuckoo

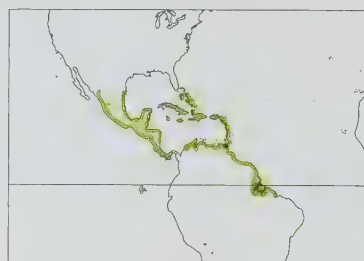
Coccyzus minor

French: Coulicou manioc **German:** Mangrovekuckuck **Spanish:** Cuclillo de Manglar
Other common names: Maynard's Cuckoo

Taxonomy. *Cuculus minor* J. F. Gmelin, 1788, Cayenne.

Forms a superspecies with *C. ferrugineus*, with which has been considered conspecific. Up to 13 races have been described, but these were all based on small samples; larger series now available show no constant differences in colour or size among island populations in West Indies, or between island and continental populations. Monotypic.

Distribution. Caribbean parts of Florida through Bahamas to Greater and Lesser Antilles, and S Mexico (Sinaloa and Tamaulipas to Yucatán and Oaxaca) through Central America to Colombia, then E to estuary of Amazon; Trinidad.



Descriptive notes. 34 cm; 64 g. Adult greyish brown above, crown greyish, broad black eye-line, flight-feathers brown, tail dark with white oval tips; polymorphic, with dark morph rich cinnamon below, and pale morph whitish to buff below; eye-ring inconspicuous grey to yellow, iris brown, bill black above, yellow or orange below, feet grey. Juvenile with wing-coverts and flight-feathers edged rufous, eye-line and tail spots indistinct, breast buffy-white, bill dark above and pale below. Variation in coloration of upperparts and intensity of buff below appears not to be strictly geographic. VOICE. Low, guttural “gawk gawk

gawk gawk gaawk gaawk”, also a single “whit!”.

Habitat. *Avicennia* mangroves, estuaries, thickets near water, secondary forest, dry scrub and lightly wooded tropical deciduous forest, mainly in understorey, also montane (280–500 m) rain forest in Lesser Antilles. Coastal, mainly lowlands near sea-level, occurs locally to 1100 m, and sometimes breeds in semi-arid habitat as high as 1300 m.

Food and Feeding. Insects, mainly caterpillars and grasshoppers (Acrididae), also crickets, mantids, stick insects, roaches, earwigs, cicadas, stink bugs, beetles, spiders; snails, lizards, fruit. Perches and scans vegetation, then pursues its prey by hops and runs.

Breeding. Breeds May–Jul in S Florida, Apr–May in Cayman Is, Mar–Oct in Puerto Rico, Jul in Hispaniola, Mar–Jul in Lesser Antilles (St Vincent, Grenadines), Jul in S Mexico (Oaxaca). Nest a flat platform of sticks and leaves, 2–3 m above water in mangroves or in fork of tree above ground. Eggs 2 (2–4), white to bluish; 31 x 23 mm. Both parents carry food.

Movements. Migratory in S Florida and Florida keys, though a few winter records, mainly in inland hardwood hammocks; arrives in late Mar and departs in late Sept. Observations seasonal from Jan to Sept in Hispaniola. Permanent resident in Pacific region of Oaxaca. Hurricanes may be responsible for some episodic movements, and the different appearance of samples of cuckoos taken in the same place in different years may reflect natural reintroductions and local extinctions of small founding populations.

Status and Conservation. Not globally threatened. Generally uncommon to fairly common throughout range. Rare to uncommon in Florida (mainly on Gulf coast and keys), where jeopardized by human development of mangrove habitat. Common in West Indies, especially Jamaica and Puerto Rico, but uncommon in Cuba, and not known on Barbados E of the main chain of Lesser Antilles. Common in Caribbean Mexico and Central America to Pacific slope of W Panama, and from the Guianas (breeding unknown in French Guiana and Surinam) to Trinidad, but only a few records are known from Venezuela and Colombia; uncommon in Oaxaca, S Mexico.

Bibliography. Anon. (1983), Banks & Hole (1991), Benito-Espinal & Hautcastel (1988), Bent (1940), Biaggi (1983), Binford (1989), Bradley (1985), Brudnell-Bruce (1975), Buden (1987), DeGraaf & Rappole (1995), Dod (1981), Faaborg (1985), Faaborg & Winters (1979), ffrench (1991), Griscom & Greenway (1941), Harrison (1978), Haverschmidt & Mees (1994), Hilty & Brown (1986), Howell & Webb (1995a), Hughes (1997b), Kaufman (1996), Keith (1997), Langridge (1990), McNair (1991), Meyer de Schauensee & Phelps (1978), Monroe (1968), Paynter (1955), Peterson (1980), Phelps & Phelps (1958), Price *et al.* (1995), Ridgely & Gwynne (1989), Ridgway (1916), Robertson (1978a), Rowley (1984), Selander & Gillier (1959), Sick (1985, 1993), Slud (1964), Snyder (1966), Stevenson & Anderson (1994), Stiles & Skutch (1989), Stokes & Stokes (1996), Stotz *et al.* (1996), Terborgh *et al.* (1978), Thurber *et al.* (1987), Tostain *et al.* (1992), Wallace *et al.* (1996), Wetmore (1916, 1968), Wetmore & Swales (1931).

111. Cocos Cuckoo

Coccyzus ferrugineus

French: Coulicou de Cocos **German:** Cocoskuckuck **Spanish:** Cuclillo de Isla del Coco

Taxonomy. *Coccyzus ferrugineus* Gould, 1843, Cocos Island.

Forms a superspecies with *C. minor*, with which has been considered conspecific. Monotypic.

Distribution. Cocos I, off Costa Rica.

Descriptive notes. 32 cm; 70 g. Adult greyish brown above, forehead and crown slate, narrow blackish facial mask, remiges rufous (brown in *C. minor*), tail broadly white-tipped, underparts uniform rich buff; eye-ring yellow, bill black above, yellow below with black tip. Juvenile with tail pattern indistinct. VOICE. Utters a deep, coughing “kcha”, repeated 5–8 times; also makes a resonant guttural “k’k’k’k’ru’ho”.

Habitat. Tropical lowland evergreen forest; *Hibiscus* thickets, tangles, hanging vines along streams, second-growth forest.

Food and Feeding. Insects, including large ones (sphingid caterpillars, cicadas), also lizards. Forages in dense vegetation; hops and runs in vegetation.



Collar *et al.* (1994), Slud (1967), Stiles & Skutch (1989), Stotz *et al.* (1996).

Breeding. Not described.

Movements. Resident.

Status and Conservation. **VULNERABLE.** Uncommon, and vulnerable owing to its small range. It is confined to the forests of Cocos I., which has a total area of just 47 km², and is the least common of the native landbirds of that island. This is a poorly known cuckoo, and it is possibly under-recorded in the interior forests of Cocos I. Threats to the species' survival are rats, cats and overgrazing by introduced deer, pigs and goats. Populations should be closely monitored.

Bibliography. Anon. (1983), Collar & Andrew (1988),

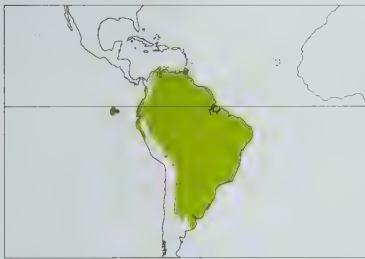
112. Dark-billed Cuckoo

Coccyzus melacoryphus

French: Coulicou de Vieillot **German:** Kleiner Mangrovekuckuck **Spanish:** Cuculillo Canela
Other common names: Azara's Cuckoo

Taxonomy. *Coccyzus melacoryphus* Vieillot, 1817, Paraguay. Monotypic.

Distribution. W Colombia, Ecuador and NW Peru; lowlands E of the Andes, from NE Colombia and Venezuela, Guianas and Brazil S to Uruguay and C Argentina, with one record N Chile; also Trinidad and Galapagos Is.



Descriptive notes. 27 cm; 50 g. Adult greyish brown above, buff below, crown and nape grey, black mask through eye and ear-coverts, narrow grey band down side of neck, tail long, bronzy above, blackish below, with broad white tips; eye-ring grey or olive-yellow, iris black, bill black, feet slate-grey. Juvenile duller, crown and nape brown, wings sometimes rufous, wing-coverts with indistinct buff tips, wing-linings buff (paler than in *C. americanus*), tail without distinct white tips. Voice. Song "cu-cu-cu-cu-kolp, kolp, kulop", of which last notes may be omitted; also utters a dry rattle, "dddddrr".

Habitat. Inhabits tropical deciduous forest, gallery forest, secondary forest, river-edge forest, shade trees of coffee plantations, tropical lowland evergreen forest; humid woodland edges, thickets and mangroves, drier ranchland shrubbery, forest openings, transitional forests with seasonal flooding, lake and river margins, thick viny growth, coastal plains. Mainly lowlands from sea-level to 1200 m, but to 1800 m in NW Argentina, to 2100-2400 m in Colombia, and to 2800 m in semi-arid montane valleys of Ecuador and E Andean slopes of Peru; high-altitude observations have been made up to 3600 m.

Food and Feeding. Diet known to include insects, mainly caterpillars, also grasshoppers, beetles and ants.

Breeding. Breeds Oct in Colombia, Oct-Dec in Argentina. Nest a flat platform of sticks, built in trees and bushes. Eggs 2-3, 3-4 (5) in Argentina, green to pale blue; 30 x 23 mm.

Movements. Partly migratory. Present throughout year W of Andes in Colombia; seasonal in non-breeding period (May-Sept) in the llanos of Venezuela, in Surinam and in Guianas, and in the breeding season (Oct-Dec) in S Brazil and Argentina. Accidental Falkland Is (Malvinas).

Status and Conservation. Not globally threatened. Generally reckoned to be fairly common throughout its expansive range, although no quantitative data available.

Bibliography. Belton (1984), Bennett (1937), Canevari *et al.* (1991), Contreras & Contreras (1990), Contreras *et al.* (1990), Dabbene (1926), Dunning (1987), Ervin (1989), Fjeldsá & Krabbe (1990), Friedmann (1927, 1948b), Harris (1973), Haverschmidt & Mees (1994), Herklots (1961), Hilty & Brown (1986), Johnson (1972), Klimaitis & Moschione (1987), Lévêque (1964), Meyer de Schauensee & Phelps (1978), Mitchell (1957), Nellar (1993), de la Peña (1988, 1996), Phelps & Phelps (1958), do Rosário (1996), Short (1975), Sick (1985, 1993), Sneath (1928), Snyder (1966), Stotz *et al.* (1996), Terborgh *et al.* (1984), Thomas (1978, 1979), Tostain *et al.* (1992), Wetmore (1926).

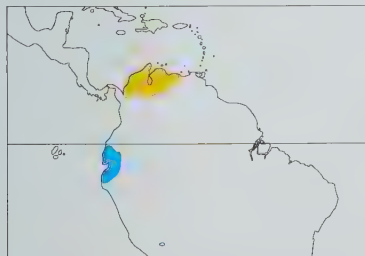
113. Grey-capped Cuckoo

Coccyzus lansbergi

French: Coulicou à tête grise **German:** Lansbergkuckuck **Spanish:** Cuculillo Cabecigrís

Taxonomy. *Coccyzus lansbergi* Bonaparte, 1850, Santa Fé de Bogotá, Colombia. Monotypic.

Distribution. N Colombia and N Venezuela. Migrates to SW Ecuador and W Peru.



Descriptive notes. 26 cm; 47 g. Adult rufous brown above with grey cap, dark rufous buff below, long black tail with white tips, central rectrices all dark; eye-ring dull yellowish grey, iris brown, bill black with grey or yellow basal spot below, feet blackish. No information available on juvenile plumage. Voice. Fast series of 6-8 hollow "cu" notes, "cucucucucucu-cu".

Habitat. Tropical deciduous forest, arid forest, bushy fields, gallery forest, in middle storey and canopy; low thickets and dense shrubs near water. Sea-level to 800 m, to 600 m in Colombia, occasionally to 1400 m in Venezuela.

Food and Feeding. Insects, mainly caterpillars.

Breeding. Nest a flat platform of twigs and lichens, 1-2 m above ground in horizontal branches. Eggs 2-3, greenish white; 26 x 20 mm.

Movements. Not well known. Wholly or partly migratory; seasonal in SW Ecuador; observed in Bosque Ampay in Apurímac, C Peru, suggesting an Andean crossing. A record from Bonaire in

Lesser Antilles may also indicate dispersal or seasonal movements, but otherwise no records in S Caribbean islands or West Indies.

Status and Conservation. Not globally threatened. Distribution is incompletely known, and species appears to be generally rare within limited known range. Further research required, primarily to define limits of range.

Bibliography. Anon. (1983), Bloch *et al.* (1991), Butler (1979), Dunning (1982, 1987), Fjeldsá & Krabbe (1990), Griscom & Greenway (1941), Hilty & Brown (1986), Koepcke (1970), Marchant (1960), Meyer de Schauensee (1982), Meyer de Schauensee & Phelps (1978), Parker *et al.* (1982), Phelps & Phelps (1958), Ridgely & Gwynne (1989), Schönwetter (1967), Stotz *et al.* (1996), Voous (1983).

Genus SAUROTHERA Vieillot, 1816

114. Cuban Lizard-cuckoo

Saurothera merlini

French: Tacco de Cuba **German:** Eidechsenkuckuck **Spanish:** Cuco-lagartero Cubano
Other common names: Great Lizard Cuckoo

Taxonomy. *Saurothera merlini* d'Orbigny, 1839, Cuba.

Population of Andros has sometimes been separated as race *andrina*. Four subspecies recognized.

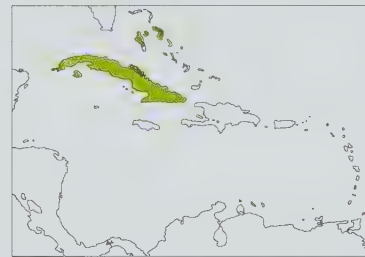
Subspecies and Distribution.

S. m. bahamensis Bryant, 1864 - Bahama Is of Andros, New Providence and Eleuthera.

S. m. santamariae Garrido, 1971 - islands off NC Cuba.

S. m. merlini d'Orbigny, 1839 - Cuba.

S. m. decolor Bangs & Zappey, 1905 - I of Pines.



Descriptive notes. 54 cm; 154 g. Adult olive-brown above, primaries rufous, breast light grey, belly rufous, long tail grey with black subterminal band and broad white tips, central rectrices all grey; bare skin around eye red, iris grey to brown, bill long and straight, blackish above, paler below. Juvenile rectrices narrow, more pointed and without distinct terminal spots, iris brown. Race *decolor* greyish brown above; *santamariae* longer-billed; *bahamensis* smaller, grey above, belly washed buff, central rectrices with subterminal black band. Voice. A throaty "ka-ka-ka-ka-ka-kau-kau-ko-ko", also a guttural "tuc-wuh-h".

Habitat. Tropical lowland evergreen forest, tropical deciduous forest, secondary forest, pine forest; seen in woodland and thickets, vines and creepers, abandoned coffee plantations, overgrown pastures, and rough limestone hills. Lowlands to 1200 m.

Food and Feeding. Lizards, locusts. Forages in middle storey and canopy. No further information available.

Breeding. Nest a shallow saucer of twigs, in tree. Eggs 2-3, white; 40 x 30 mm.

Movements. Resident.

Status and Conservation. Not globally threatened. Rather limited range, but species is common to fairly common, widespread and rather tame. Used in traditional medicine for claimed effectiveness in convalescence and restoration of sexual powers.

Bibliography. Anon. (1983), Barbour (1943), Bond (1985), Brudenell-Bruce (1975), Garrido (1971), Garrido & García (1975), Miller (1894), Ridgway (1916), Schönwetter (1967), Stotz *et al.* (1996), Sulley & Sulley (1992), Todd & Worthington (1911), Vaurie (1957), Wallace *et al.* (1996), Wauer (1996).

115. Puerto Rican Lizard-cuckoo

Saurothera vieilloti

French: Tacco de Porto Rico **Spanish:** Cuco-lagartero Portorriqueño
German: Puerto-Rico-Kuckuck

Taxonomy. *Saurothera vieilloti* Bonaparte, 1850, Antilles.

Has been considered conspecific with *S. longirostris* and *S. vetula*, and these three form a superspecies. Monotypic.

Distribution. Puerto Rico.



Descriptive notes. 42 cm; 80 g. Adult washed rufous above, primaries same colour as back, tail long with broad white tips, throat white, breast grey, belly rufous; bare skin around eye red, white crescent below eye, iris brown, bill long and straight, black above, pale below. Juvenile brown above with rufous feather edges, chin and throat light grey, belly paler rufous than adult, tail narrower and paler with broad black bands, tips more pointed, bill dark above, pale below. Voice. As congeners, an emphatic "ka-ka-ka-ka..." gradually accelerating and becoming louder, also soft call "caw".

Habitat. Tropical deciduous forest, tropical lowland evergreen forest; woodland, coffee plantations, brush-covered limestone hills. Lowlands and in mountains to 800 m.

Food and Feeding. Small lizards, large spiders, large insects (stick insects). Forages in middle storey and canopy. Often lifts bits of loose bark off trees and dead pieces of cacti, in order to reveal prey beneath.

Breeding. Breeding records in Apr, May, Sept, Nov and Dec. Nest a loose platform of sticks and leaves. Eggs 2-3, pale blue with a thin white layer; 34 x 25 mm.

Movements. Resident.

Status and Conservation. Not globally threatened. Very limited range, within which species appears to be generally common to fairly common, but locally rare, in wooded areas.

Bibliography. Anon. (1983), Biaggi (1983), Bond (1985), Faaborg (1985), Faaborg & Winters (1979), Raffaele (1989), Schönwetter (1967), Stotz *et al.* (1996), Wauer (1996), Wunderle (1995).

116. Hispaniolan Lizard-cuckoo

Saurothera longirostris

French: Tacco d'Hispaniola **German:** Haitikuckuck **Spanish:** Cuco-lagartero de la Española

Taxonomy. *Cuculus longirostris* Hermann, 1783, Hispaniola.

Has been considered conspecific with *S. vieilloti* and *S. vetula*. Population of Saona I has sometimes been separated in race *saonae*. Two subspecies recognized.

Subspecies and Distribution.

S. l. longirostris (Hermann, 1783) - Hispaniola and Saona I.

S. l. petersi Richmond & Swales, 1924 - La Mahotiére and Gonâve I.



Sea-level to 2000 m.

Food and Feeding. Insects (especially grasshoppers, mantids, also caterpillars, cockroach, cicadas), small snakes and lizards. Forages in middle storey and canopy, moving with long strides through branches, also creeps and crawls through dense branches near ground; rests quietly for minutes; inquisitive and fearless.

Breeding. Breeding records in May (eggs), Jun (fledgling) and Dec (grown juvenile). Nest a flat platform of leaves, placed on stump of a tree. Eggs 2-3, pale blue with a thin white layer; 37 x 25 mm.

Movements. Resident.

Status and Conservation. Not globally threatened. Common to fairly common within rather restricted range. Rural people eat the flesh of this cuckoo in the traditional belief that it will promote appetite and cure indigestion.

Bibliography. Anon. (1983), Bond (1985), Dod (1981, 1987, 1992), Faaborg (1985), Kaempfer (1924), Latta & Wunderle (1996), Stotz *et al.* (1996), Wauer (1996), Wetmore & Swales (1931), Wunderle & Latta (1996).

117. Jamaican Lizard-cuckoo

Saurothera vetula

French: Tacco de la Jamaïque **German:** Jamaikakuckuck **Spanish:** Cuco-lagartero Jamaicano
Other common names: Old Woman Bird

Taxonomy. *Cuculus Vetula* Linnaeus, 1758, Jamaica.

Both *S. vieilloti* and *S. longirostris* have been considered races of present species. Monotypic.

Distribution. Jamaica.



Descriptive notes. 40 cm; 95 g. Adult greyish above, forehead to nape dark brown, wings with rufous patch formed by primaries, throat whitish, below rufous, paler on undertail-coverts; tail long, central rectrices grey with black subterminal band and broad white tip, others black with broad white tips; orbital skin red, iris brown, bill long, straight, black above, paler below. No information available on juvenile plumage. **VOICE.** Rapid, low "cak-cak-ka-ka-ka-k-k".

Habitat. Tropical lowland evergreen forests, possibly also tropical deciduous ones; wooded areas and semi-arid country with trees and

shrubs, in wet mountain areas and brush-covered limestone hills. Lowlands to 1200 m.

Food and Feeding. Lizards, caterpillars, locusts, nestling birds. Forages in middle storey and canopy.

Breeding. Courtship feeding and copulation observed in Oct. Nest a flat platform of twigs, lined with leaves, in a tangle of branches, twigs and bromeliads in a tree. Eggs pale blue; 32.5 x 24 mm.

Movements. Resident.

Status and Conservation. Not globally threatened. Widespread within limited range of Jamaica, but generally uncommon. Compared with its congeners, relatively little is known about this species, and further research is required to determine various aspects of its breeding.

Bibliography. Anon. (1983), Bond (1985), Cruz (1975), Curio (1970), Danforth (1928), Downer & Sutton (1990), Gosse (1847), Levy (1984), Schönwetter (1967), Stotz *et al.* (1996), Wauer (1996).

Genus *HYETORNIS* P. L. Sclater, 1862

118. Chestnut-bellied Cuckoo

Hyetornis pluvialis

French: Piaye de pluie **German:** Regenkuckuck **Spanish:** Cuco Picogordo de Jamaica
Other common names: Old Man Bird, Hunter

Taxonomy. *Cuculus pluvialis* J. F. Gmelin, 1788, Jamaica.

Sometimes included within genus *Piaya*. Monotypic.

Distribution. Jamaica.



Descriptive notes. 50 cm; 130 g. Adult large, dull brown above, face and breast light grey, throat paler, belly dark rufous, tail purple-glossed black with broad white tips; orbital skin black, iris red to brown, bill rather heavy, thick and decurved, blackish, feet dark grey. Juvenile with tail unglossed dark brown, but also showing the broad white tips that are present in the adult. **VOICE.** Hoarse "quak-quak-ak-ak-ak", slow, then accelerating towards end.

Habitat. Tropical lowland evergreen forest, secondary forest, in thickets in open areas, woodland; in wet mountain areas and brush-covered

limestone hills. Lowlands to 1500+ m.

Food and Feeding. Lizards, mice, insects, caterpillars, nestlings and eggs. Forages in middle storey and canopy of forest; runs along branches, glides on outstretched wings from tree to tree.

Breeding. Nest a shallow saucer of twigs, placed in tree. Eggs 2-4, white.

Movements. Resident. Moves to lower elevations in winter.

Status and Conservation. Not globally threatened. An uncommon and rather poorly known cuckoo with restricted range; further research and a proper survey of this species' population and status are needed.

Bibliography. Anon. (1983), Bond (1985), Cruz (1973), Danforth (1928), Downer & Sutton (1990), Faaborg (1985), Gosse (1847), Levy (1996), Stotz *et al.* (1996), Wauer (1996).

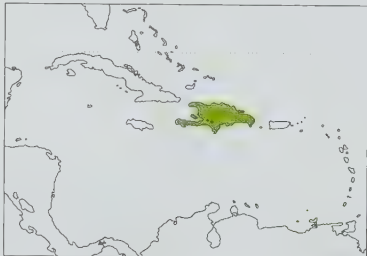
119. Rufous-breasted Cuckoo

Hyetornis ruficularis

French: Piaye cabrite **German:** Dominikanerkuckuck **Spanish:** Cuco Picogordo de la Española
Other common names: Bay-breasted Cuckoo

Taxonomy. *Coccyzus ruficularis* Hartlaub, 1852, mountain forests of Dominican Republic. Sometimes included within the genus *Piaya*. Monotypic.

Distribution. Hispaniola and Gonâve I.



Descriptive notes. 48 cm; 128 g. Adult grey above, chestnut on primaries, chin to breast dark chestnut, belly pale rufous, tail long with broad white tips; eyelids yellow, iris brown, decurved bill black with yellow lower mandible, feet grey. No information available on juvenile plumage. **VOICE.** Guttural crow-like call, "û-wack-û-wack-û-wack-"; also bleats like a lamb.

Habitat. Tropical deciduous forest in arid lowlands to mountain rain forest. Lowlands to 900+ m.

Food and Feeding. Insects, including grasshoppers, mantids, grubs and caterpillars, pentatomids and beetles; also lizards, mice. Forages in middle storey and canopy; leaps from branch to branch in trees.

Breeding. Virtually unknown. One bird in May had an egg in the oviduct, ready to be laid. Nests in trees, on a platform of sticks. Eggs 2, white.

Movements. Resident.

Status and Conservation. **VULNERABLE.** A shy species which remains in cover, this cuckoo is apparently rare to uncommon within its restricted range. It is considered vulnerable because of an evident decline in its numbers in 20th century. It occurs in four protected areas in W Dominican Republic, where it is rare; most recent records come from lower portions of Sierra de Bahoruco National Park, in the centre of the island, where good forest persists. It is at best exceedingly rare in Haiti, whence it may already have disappeared; there are no recent records from Gonâve I. A thorough survey of the species is needed throughout its range.

Bibliography. Anon. (1983), Bond (1928a, 1985), Collar, Crosby & Stattersfield (1994), Collar, Gonzaga *et al.* (1992), Cory (1895), Danforth (1929), Dod (1981, 1987, 1992), Moltoni (1932), Schwartz & Klinikowski (1965), Stotz *et al.* (1996), Verrill & Verrill (1909), Wauer (1996), Wetmore & Swales (1931).

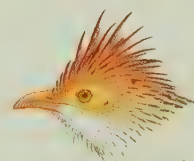
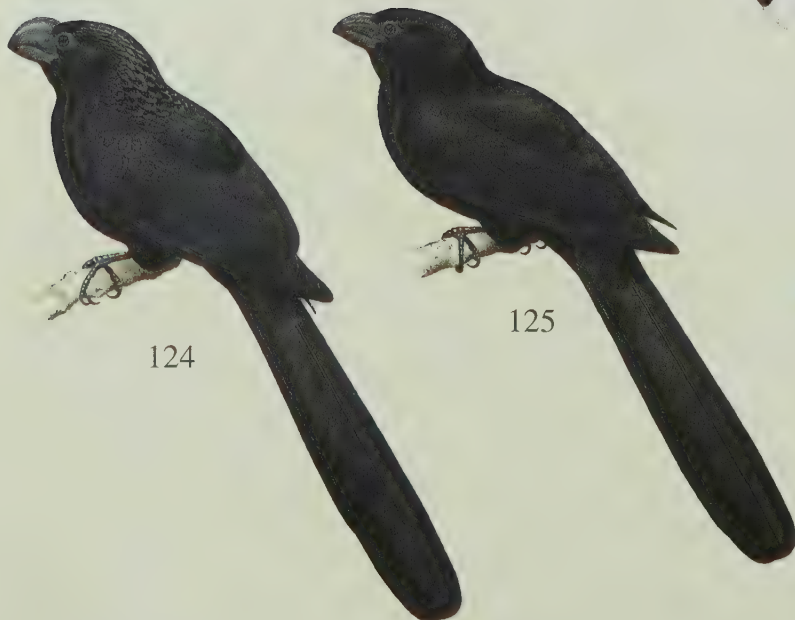
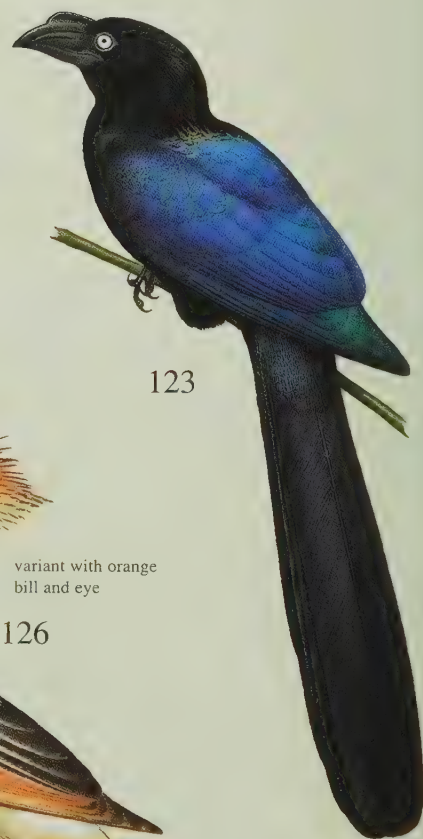


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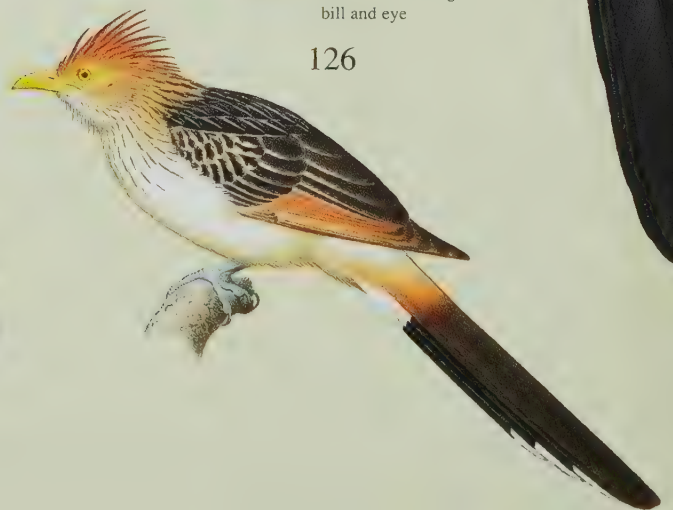


ssp. gracilis

ssp. minuta



126



Genus *PIAYA* Lesson, 1830

120. Squirrel Cuckoo

Piaya cayana

French: Piaye écreuil

German: Eichhornkuckuck

Spanish: Cuco-ardilla Común

Taxonomy. *Cuculus cayanus* Linnaeus, 1766, Cayenne.

The abruptness and rarity of intergradation between the forms *mexicana* and *thermophila* in Oaxaca, S Mexico, suggest that these forms may belong to distinct species, though a few intermediates are known. Fourteen subspecies recognized.

Subspecies and Distribution.

P. c. mexicana (Swainson, 1827) - Mexico, on Pacific slope and inland S to Isthmus of Tehuantepec.
P. c. thermophila P. L. Sclater, 1860 - E Mexico (E San Luis Potosí and S Tamaulipas S to Veracruz, Yucatán and Isthmus of Tehuantepec on Gulf coast S to near Tehuantepec City) through Central America to Panama and NW Colombia.

P. c. nigricrissa (Cabanis, 1862) - W Colombia (occurring E to slopes of C Andes), W Ecuador, NW & EC Peru.

P. c. mehleri Bonaparte, 1850 - NE Colombia E of Gulf of Urabá to Magdalena Valley and along W slope of E Andes, E in coastal Venezuela to Paria Peninsula.

P. c. mesura (Cabanis & Heine, 1863) - Colombia E of Andes, and E Ecuador.

P. c. circe Bonaparte, 1850 - Venezuela S of L Maracaibo.

P. c. cayana (Linnaeus, 1766) - E & S Venezuela through the Guianas and S to N bank of lower Amazon.

P. c. insulana Hellmayr, 1906 - Trinidad.

P. c. obscura Sneath, 1908 - C Brazil S of Amazon, from R Jurua E to R Tapajós and S to upper Gy-Paraná.

P. c. hellmayri Pinto, 1938 - Brazil S of Amazon, from Santarem to mouth of Amazon, and coast of N Maranhão.

P. c. pallescens (Cabanis & Heine, 1863) - E Brazil.

P. c. cabanisi J. A. Allen, 1893 - S Brazil, in C Mato Grosso and Goiás to N São Paulo.

P. c. macroura Gambel, 1849 - SE Brazil to Paraguay, NE Argentina and Uruguay.

P. c. mogenseni J. L. Peters, 1926 - S Bolivia to NW Argentina.

Descriptive notes. 46 cm; 98 g (Mexico and Central America). Race *mexicana* rich chestnut above, long graduated tail rufous above with black subterminal band and white tip; throat rufous, breast and abdomen grey, undertail-coverts black, undertail dark chestnut with broad white tips; bare skin around eye yellowish green (red E of Andes), iris red, feet light bluish grey. Juvenile similar, tail without black band, skin around eye grey, iris brown, bill grey-horn, feet grey. Race *thermophila* darker rufous, belly and undertail-coverts dark grey to black; *nigricrissa* darker still, belly and undertail-coverts blackish; *mehleri* more rufous, lighter throat and breast grading to light grey on belly, undertail blackish; *mesura* as *nigricrissa*, averages smaller (overlap); *circe* slightly more rufous than *mehleri*; *cayana* as *thermophila*, belly ashy-grey, undertail-coverts darker grey; *insulana* similar, but undertail-coverts black; *obscura* darker (less rufous); *hellmayri* more tan (less rufous); *pallescens* paler, more tan and less red or grey; *cabanisi* more rufous, rusty throat, pale below; *macroura* dark above, belly and undertail-coverts blackish, long purple tail; *mogenseni* lighter rufous above, dark grey (not blackish) below, rusty throat. VOICE. A 3-note dry rolling "hic-a-ro" or "geep-kareer", a "chick-kaw", a repeated "wheep-wheep-wheep...", a dry rattle or churr, and a sharp "kipi".

Habitat. Tropical lowland evergreen forest, tropical deciduous forest, old secondary forest, gallery forest, mangroves, flooded tropical evergreen forest; occurs in canopy in open forest, tangles of vine, coffee plantations, shrubbery, pastures with scattered trees, watercourses in dry regions, high-ground forest, transitional forest with seasonal inundations, also residential areas (Brazil), avoids dense lowland forests. Lowlands at sea-level to 2700 m.

Food and Feeding. Insects, mainly caterpillars (green or hairy), grasshoppers, stick insects, moths, beetles, ants. An arboreal gleaning insectivore in canopy and subcanopy, usually in pairs, or in mixed flocks, sometimes solitary; occasional at army-ant swarms. Hops along limbs or through vines in bounding leaps; leaps from branch to branch, runs along branch like a squirrel, glides across open spaces with bursts of shallow wingbeats. Forages by concealment in foliage, scans surfaces of leaves, then pounces; also catches flying ants with short fluttering flights, and capable of sustained flight.

Breeding. Breeds in Mexico in Jul (Jalisco), May (Oaxaca); in Costa Rica in both dry and wet seasons, Jan-Aug; in French Guiana Apr-Sept, in Surinam Mar-Jul and Sept. Adult feeds its mate. Nest a shallow platform of leaves, or sticks and green leaves, in thick shrubbery or in tree (resembles deciduous litter hanging in lianas of thick understory). Eggs 2-3, chalky white; 35 x 26 mm; incubation 18 days, by both parents, in spells of 6-8 hours each. Nestling (*mexicana*) has black skin covered with hair-like down, mouth-lining red (black in adults); cared for by both parents, fed large insects (c. 1 per hour); young leave nest before they can fly, by 8+ days. Nests repeatedly in a season.

Movements. Resident.

Status and Conservation. Not globally threatened. Generally common to very common throughout most of its extensive range, e.g. common in many parts of Guatemala, Costa Rica, Colombia, Ecuador, Brazil and Bolivia; density of 4 pairs/100 ha recorded in area of floodplain forest in Amazonian Peru.

Bibliography. Belton (1984), Binford (1989), Canevari *et al.* (1991), Chebez (1993), Contreras *et al.* (1990), Cory (1918), Fjeldså & Krabbe (1990), Friedmann (1948b), Griscom & Greenway (1941), Gyldenstolpe (1945), Haffer (1975), Haverschmidt & Mees (1994), Hellmayr (1929), Herklots (1961), Hilty & Brown (1986), Howell & Webb (1995a), Junge (1937b), Klimaitis & Moschione (1987), Meyer de Schauensee & Phelps (1978), Miller (1963),

Mitchell (1957), Monroe (1968), Naumburg (1930), de la Peña (1988), Phelps & Phelps (1958), Pinto (1938), Ridgely & Gwynne (1989), do Rosário (1996), Rowley (1984), Schaldach (1963), Schubart *et al.* (1965), Selander & Giller (1959), Short (1975), Sick (1985, 1993), Skutch (1966, 1983), Slud (1964), Snyder (1966), Stiles & Skutch (1989), Stotz *et al.* (1996), Terborgh, Fitzpatrick & Emmons (1984), Terborgh, Robinson *et al.* (1990), Tostain *et al.* (1992), Waldrigues *et al.* (1983), Wetmore (1939, 1968), Willis & Eisenmann (1979), Zimmer (1930).

121. Black-bellied Cuckoo

Piaya melanogaster

French: Piaye à ventre noir

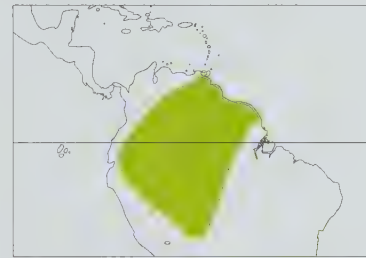
German: Schwarzbauchkuckuck

Spanish: Cuco-ardilla Ventrinegro

Taxonomy. *Cuculus melanogaster* Vieillot, 1817, Java; error = Cayenne.

Monotypic.

Distribution. SE Colombia, E Venezuela and the Guianas S to E Ecuador, E Peru, N Bolivia and Brazil (Amazonia S to Mato Grosso).



Descriptive notes. 38 cm; 102 g. Adult rufous-chestnut above with light grey cap, throat and breast orange-buff, becoming black on abdomen and undertail-coverts, tail rufous with subterminal black band and broad white tip; bare orbital skin pale blue, large yellow loreal spot, iris dark brown to red, bill red, feet lead-grey to black. Juvenile similar. VOICE. Song a loud "jjit, jjit-jjit-jjit"; scratchy descending "yaaaaa", also a dry rattle.

Habitat. Tropical lowland evergreen forest, absent from coastal region; also occurs in shrubby growth away from forest, and occasionally in savanna woodland. Lowlands to 800 m.

Food and Feeding. Insects, including grasshoppers, katydids, caterpillars, beetles and ants. Feeds in canopy.

Breeding. One record of young being fed in Jul, French Guiana. Nest undescribed. Eggs white; 30 x 23 mm.

Movements. Resident.

Status and Conservation. Not globally threatened. Generally uncommon and relatively little known. Despite occurrence in shrubby vegetation, species is reckoned to be sensitive to habitat disturbance.

Bibliography. Dunning (1987), Friedmann (1948b), Griscom & Greenway (1941), Haverschmidt & Mees (1994), Hilty & Brown (1986), Meyer de Schauensee & Phelps (1978), Naumburg (1930), Olog (1968), Parker & Remsen (1987), Phelps & Phelps (1958), Remsen & Traylor (1989), Schönwetter (1967), Schubart *et al.* (1965), Sick (1985, 1993), da Silva (1996), Snyder (1966), Stotz *et al.* (1996), Tostain *et al.* (1992).

122. Little Cuckoo

Piaya minuta

French: Petit Piaye

German: Rötelkuckuck

Spanish: Cuco-ardilla Menor

Taxonomy. *Coccyzus minutus* Vieillot, 1817, Cayenne.

Four subspecies recognized.

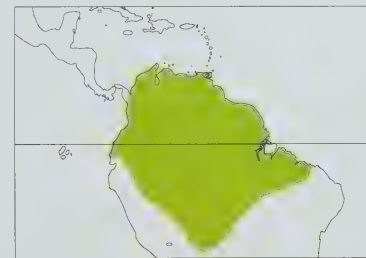
Subspecies and Distribution.

P. m. panamensis Todd, 1912 - E Panama and N Colombia W of Gulf of Urabá.

P. m. gracilis (Heine, 1863) - Colombia W of Andes, and W Ecuador.

P. m. minuta (Vieillot, 1817) - Colombia E of Andes, Venezuela and Guianas S to Amazonian Peru, SC Brazil (Goiás, Mato Grosso) and Bolivia; Trinidad.

P. m. chaparensis Cherrie, 1916 - N Bolivia.



Descriptive notes. 25 cm; 40 g. Adult chestnut above, throat and breast rufous-chestnut, belly dark buffy-grey, tail with white terminal spots; eye-ring red, iris red, bill greyish yellow with dusky tip, feet dull blue to greyish black. Juvenile grey-brown above, darker grey below, wings rufous or blackish, no white on tail, iris brown, bill dark to black, feet black. Race *gracilis* paler on throat and breast with particularly pale area around base of bill. VOICE. Harsh clucks, "tchek", like a tree frog; sharp "quienk", a nasal chattering "aannh anhh-anhy-anhh", a low whistled "tyoooooo", a weak, hoarse "geep, were".

Habitat. Inhabits tropical lowland evergreen forest edge, secondary forest, clearings, mature mangroves, river-edge forest, typically in dense, low vegetation; thickets, dense canebrakes, vines, shrubby second growth, pastures, often near water or in marshy areas; mainly coastal and on major rivers in Guianas. Sea-level to 900+ m, occasionally to 1600 m in Colombia, to 2000 m in Venezuela.

Food and Feeding. Insects, including caterpillars, wasps, beetles, bugs, flies, also spiders. Forages in understory to mid-storey.

Breeding. Eggs Jun-Sept in Surinam; in French Guiana, fledgling recently out of nest in early Mar. Nest an open, deep twig cup in thick shrubs. Eggs 2, white; 24 x 19.5 mm, weight 4.6 g.

Movements. Not known. Considered resident.

Status and Conservation. Not globally threatened. Rather limited information available about relative abundance: species is uncommon to fairly common throughout much of range; local in Colombia.

Bibliography. Dubs (1992), French (1991), Haffer (1975), Haverschmidt & Mees (1994), Herklots (1961), Hilty & Brown (1986), Hostos & Chincilla (1994), Meyer de Schauensee & Phelps (1978), O'Neill (1974), Olog (1968), Phelps & Phelps (1958), Pinto (1938), Ridgely & Gwynne (1989), Schönwetter (1967), Sick (1985, 1993), Snyder (1966), Stotz *et al.* (1996), Terborgh *et al.* (1984), Tostain *et al.* (1992), Wetmore (1968), Zimmer (1930).

Subfamily CROTOPHAGINAE

Genus *CROTOPHAGA* Linnaeus, 1758

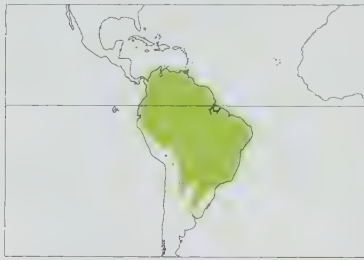
123. Greater Ani

Crotophaga major

French: Ani des palétuviers

German: Riesenani

Spanish: Garrapatero Mayor

Taxonomy. *Crotophaga major* J. F. Gmelin, 1788, Cayenne. Monotypic.**Distribution.** E Panama through tropical South America mainly E of Andes to N Argentina; Trinidad.**Descriptive notes.** 46 cm; male 162 g, female 145 g. Adult sleek glossy blue-black with bronzy green feather edges; iris white; bill compressed, with high-arched ridge at base of upper mandible, black; feet black. Juvenile iris brown. Voice. Noisy, guttural to bubbling, melodious "kro-koro", a growl, croaks, grates, hisses and whirs.**Habitat.** Flooded tropical evergreen forest, river-edge forest, gallery forest, in dense vegetation, thickets and trees along rivers, lakes, swamps and mangroves, wet forest edges, lake margins, grassy edges, thick viny and shrubby growth, marshes, often in vegetation overhang-

ing water: moves into clearings, does not move far into forest; occurs in villages in lowlands of Guianas. Occurs from lowlands to 800 m, mainly below 500 m, casually much higher in savannas (perhaps on migration), to 2600 m in E Andes of Colombia, and to 2550 m in Cochabamba, Bolivia.

Food and Feeding. Mainly insects, especially Orthoptera (grasshoppers, roaches), also caterpillars (Brassolidae), beetles, other arthropods, spiders, small lizards; fruit, berries, euphorbia seeds. Gregarious, feeds in flocks on ground and also in canopy; occasionally follows army ants, also follows groups of squirrel monkeys which flush insects; a gleaner insectivore.**Breeding.** Breeds May-Dec in Guyana, Apr-Sept in Surinam, Apr (nestlings) in French Guiana. Group-living, cooperative breeder, nests in loose colonies; groups defend territories against other groups. Nest a bulky mass of sticks and green leaves, on branches over water. Eggs 2-3 in Panama, 4-5 in Argentina (clutches of up to 6 may include eggs of more than one female), greenish blue covered by white chalky surface film; 45 x 38 mm.**Movements.** Resident; some local movements.**Status and Conservation.** Not globally threatened. Fairly common throughout its range. May possibly have occurred earlier in Mexico (S Tamaulipas), from where two 1960 specimens reported, but no evidence of its presence there either before or since. Said to be distasteful to cats and to human beings, this bird's body has a disagreeable odour.**Bibliography.** Belton (1984), Canevari *et al.* (1991), Chebez (1993), Contreras *et al.* (1990), Davis (1941a), Fjeldså & Krabbe (1990), Gyldestolpe (1945), Haverschmidt & Mees (1994), Herklots (1961), Hilty & Brown (1986), Howell & Webb (1990, 1995a), Meyer de Schauensee & Phelps (1978), Nellar (1993), Olson (1978), de la Peña (1988), Phelps & Phelps (1958), Ridgely & Gwynne (1989), do Rosário (1996), Schubart *et al.* (1965), Short (1975), Sick (1985, 1993), Snyder (1966), Stotz *et al.* (1996), Terborgh, Fitzpatrick & Emmons (1984), Terborgh, Robinson *et al.* (1990), Thomas (1978), Tostain *et al.* (1992), Waldrigues *et al.* (1983), Wetmore (1939, 1968), Willis (1983), Willis & Eisenmann (1979), Young (1925, 1929).

124. Smooth-billed Ani

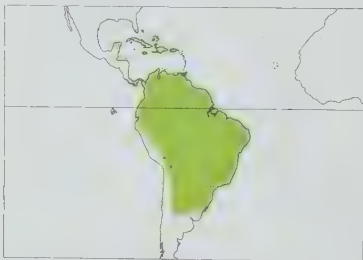
Crotophaga ani

French: Ani à bec lisse

German: Glattschnabelani

Spanish: Garrapatero Aní

Other common names: Black Witch, Tick Bird

Taxonomy. *Crotophaga Ani* Linnaeus, 1758, Jamaica. Monotypic.**Distribution.** C & S Florida, Bahamas, Caribbean Islands, Trinidad, Tobago; locally in Mexico (mainland and islands of Quintana Roo), Costa Rica and Panama, and S on W coast to Ecuador, E of Andes from Venezuela and the Guianas through E South American lowlands to N Uruguay and Chaco to N Argentina.**Descriptive notes.** 35 cm; male 115 g, female 95 g. Adult glossy black; skin around eye black, iris brown to black; bill high-arched and laterally compressed into thin keel, swollen at base, curving down to forehead, black; feet black. Juvenile bill smaller. Voice. Whining whistle, "ouee", rising in pitch and often given in flight; querulous "que-lick"; also chatters, mews, growls and clucks.**Habitat.** Second-growth scrub, river-island scrub, humid areas, clearings in humid forests and cloud forests, scrub and scattered trees in pastures, woodland, thickets, mangroves, lake margins, grassy/edges, marshes, thick viny growth, *Cecropia* and dying trees. Sea-level to 1200 m, mainly in lowlands; to 2300 m in Colombian Andes (where heart, lungs, and body weight larger than in lowlands).**Food and Feeding.** Insects, mainly grasshoppers, also mantids, fireflies, beetles including weevil root-borers (insect pests of sugarcane and citrus orchards), bugs, caterpillars (Brassolidae), Hymenoptera, rarely ticks; also lizards, small snakes, frogs, nestling birds and eggs; "Madame Jeanette" hot peppers, fruit and seeds in dry season. Lives in small flocks, walks on ground and on branches, flies in pursuit of insects; follows cattle, plough or army ants and captures flushed insects, also catches animals fleeing from grass fires. Climbs through vegetation, using its high-ridged bill to

separate the wet, dense vegetation as it forages; often spreads wings and tail to sun after plumage thus becomes wet.

Breeding. Breeds May-Oct in Florida, all year in Puerto Rico and Surinam, during rains in Cuba and Central America (after herbs grown and grasshoppers abundant). Group-living, cooperative breeder, but adults socially monogamous, rarely polygynous; several females may lay in one nest, clutches separated by layers of green leaves, and leaves added through incubation; reused nests may have old eggs under newer leaves. Nest a large, bulky, shallow mass of interlaced sticks, in tree or thicket. Eggs 4-20 or more (product of several females), oval, greenish blue covered by a white chalky surface film; 35 x 26 mm; laid at 2-day intervals. Incubation 13-15 days, by both sexes, male feeds female while she incubates. Hatchling naked, skin black, contrasting white marks on roof of mouth and around tongue, sheathed pin-feathers grow in a few days; cared for by both sexes, fledging 10-11 days, but if disturbed by 7 days and before capable of flight.**Movements.** Resident or locally nomadic. Post-breeding dispersive movements out of breeding range. **Status and Conservation.** Not globally threatened. Generally common. First established and bred in Florida in 1938, spread N along Florida coasts in 1960's, and now a well established breeder in most counties on E coast and on W coast N to Tampa Bay; numbers increased in S Florida during 1970's. In Central America, species has expanded its range during 20th century: first recorded in Costa Rica, near Panama border, in 1931, and by 1975 had extended to Guanacaste in N; replaced *C. sulcirostris* along S half of Pacific slope; also expanded its range in Panama from 1940's to 1960's. In Caribbean, somewhat surprisingly, this species is absent on most of the Lesser Antilles and on Barbados. Ubiquitous inhabitant of rank growth throughout extensive South American range. In the hand, birds have a rather strong and unpleasant smell.**Bibliography.** Allen (1961), Balch (1979), Barbour (1943), Belton (1984), Bent (1940), Biaggi (1983), Bond (1985), Brudenell-Bruce (1975), Buden (1977), Canevari *et al.* (1991), Chebez (1993), Contreras *et al.* (1990), Davis (1940a, 1942), Dod (1981), Emlen (1977), Fjeldså & Krabbe (1990), García (1996), Harrison (1978), Haverschmidt & Mees (1994), Herklots (1961), Hilty & Brown (1986), Howell & Webb (1995a), Howell *et al.* (1992), Kaufman (1996), Keith (1997), Klimaitis & Moschione (1987), Köster (1971, 1976), Loflin (1982, 1983), Meyer de Schauensee & Phelps (1978), Miller (1963), Monroe (1968), Olivares & Munves (1973), de la Peña (1988), Peterson (1980), Price *et al.* (1995), Reichhoff (1974), Ridgely & Gwynne (1989), do Rosário (1996), Rosenberg *et al.* (1990), Rutgers & Norris (1972), Schubart *et al.* (1965), Short (1975), Sick (1985, 1993), Skutch (1966), Slud (1964), Smith, S.M. (1971), Snyder (1966), Souza (1995), Stevenson & Anderson (1994), Stiles & Skutch (1989), Stokes & Stokes (1996), Stotz *et al.* (1996), Terborgh, Faaborg & Brockmann (1978), Terborgh, Fitzpatrick & Emmons (1984), Tostain *et al.* (1992), Visscher & Moratorio (1984), Waldrigues & Ferrari (1982), Warren (1960), Wetmore (1916, 1939, 1968), Wetmore & Swales (1931), Willis (1983).

125. Groove-billed Ani

Crotophaga sulcirostris

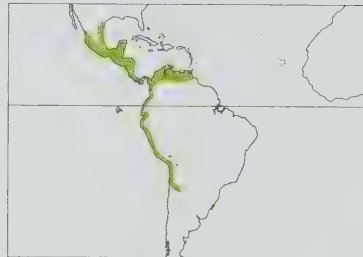
French: Ani à bec cannelé

German: Riefenschnabelani

Spanish: Garrapatero Asurcado

Taxonomy. *Crotophaga sulcirostris* Swainson, 1827, Temascaltepec, Mexico.

Monotypic.

Distribution. Gulf of Mexico from Texas and Mexico S through Central America and W South America to N Chile and NW Argentina, and N South America E to Guyana; Netherlands Antilles. Disperses N into continental North America.**Descriptive notes.** 32 cm; male 80 g, female 70 g. Adult glossy black, long loose tail; skin around eye black, iris brown to black; bill arched, laterally compressed, no hump at base, upper ridge continuous with crown, upper mandible with grooves, black; feet black. Juvenile dull black, plumage loose-webbed (unlike adult), bill without grooves. Voice. Series of "tijo" notes, the first upslurred, given in excitement or alarm; also a faster series, a querulous "whee-o", a long series of rapid whistled "kiw" notes downslurred at end, a long mournful call, and a cluck.**Habitat.** Second-growth scrub, thickets, drier scrubby areas, pastures, fields, marshes, cleared and disturbed areas in range of original vegetation, from tropical evergreen forest to tropical scrub. Sea-level to 2300 m.**Food and Feeding.** Insects, mainly grasshoppers, also cockroaches, grubs, cicadas, flies, wasps, ants, spiders; small vertebrates, including *Anolis* lizards, and seeds and berries. Feeds in groups, walking on dry ground, often with cattle and sheep, where it catches insects more rapidly than when hunting alone, especially when pursuing fleeing grasshoppers in flight; digs in cow dung for grubs, dung-beetles and other insects; rarely, takes ticks from backs of cattle. Occasionally follows army ants.**Breeding.** Breeds May-Jul in Oaxaca, Jun to early Sept in Caribbean lowlands; in Costa Rica in rainy season Jun-Nov, later in years when rains delayed; in Curaçao has bred 4 times in succession Dec 1980-Sept 1981. Group-living, cooperative breeder; several females may lay in one nest, each attended by her mate. Nest a large, open bulky platform of sticks, roots and thorns, lined with green leaves, in shrub and tree; green leaves added through laying and incubation. Eggs 3-4/female, up to 18/nest, greenish blue covered with white chalky surface film, easily scratched; 31 x 24 mm; laying interval 2-3 days. Incubation 13-14 days, by both sexes, in spells of 30-60 min at a time. Nestling black, naked, no hair-like down, but with much down on fledging; young brooded for first week, when disturbed leave nest and climb branches by day 6, if undisturbed remain to 10 days in nest; tended by parents for 3 weeks after fledging. Parents then add to old nest and repeat cycle.**Movements.** Resident, but nomadic. After breeding season, occasional birds appear 1000 km from nearest breeding areas. In Florida, appear in autumn and winter on Gulf coast, mainly in coastal scrub; autumn records in S Great Plains. Lives in flocks in non-breeding season, roosting in large groups of 30-40 birds.**Status and Conservation.** Not globally threatened. Common to abundant in much of range, replaced by *C. ani* in Pacific areas of Central America; formerly lived also on islands of S Baja California. Territories of social groups comprise 1-10 ha; birds inhabiting marshy areas have large breeding units and small territory sizes compared with those in pastures. Generally much less common than *C. ani* in areas of sympatry in South America.**Bibliography.** Araya & Millie (1986), Balch (1979), Bent (1940), Berger (1952, 1954), Binford (1989), Bolen (1974), Bowen *et al.* (1989, 1991), Canevari *et al.* (1991), Fjeldså & Krabbe (1990), Harrison (1978), Hernández *et al.* (1981), Hilty & Brown (1986), Howell & Webb (1995a), Johnson (1967), Kaufman (1996), Koford *et al.* (1986, 1990), Lowery & Dalquest (1951), Meyer de Schauensee & Phelps (1978), Miller (1932), Monroe (1968), de la Peña (1988), Peterson (1980), Phelps & Phelps (1958), Price *et al.* (1995), Rand (1953), Ridgely & Gwynne (1989), Rowley (1984), Schaldach (1963), Skutch (1959b, 1983), Slud (1964), Smith, S.M. (1971), Stevenson & Anderson (1994), Stiles & Skutch (1989), Stokes & Stokes (1996), Stotz *et al.*

(1996), Sutton (1967), Vehrencamp (1976, 1977, 1978), Vehrencamp, Bowen & Koford (1985, 1986), Vehrencamp, Koford & Bowen (1988), Wetmore (1939, 1968), Willis (1983).

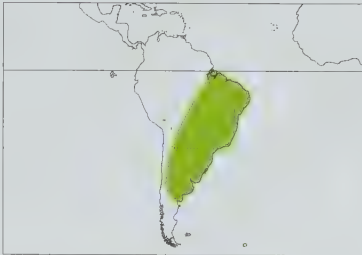
Genus *GUIRA* Lesson, 1830

126. Guira Cuckoo

Guira guira

French: Guira cantara **German:** Guirakuckuck **Spanish:** Pirincho
Other common names: White Ani

Taxonomy. *Cuculus Guira* J. F. Gmelin, 1788, Brazil. Monotypic.
Distribution. E & S Brazil, W to Bolivia and Paraguay, and S to Uruguay and N & E Argentina.
Descriptive notes. 36 cm; male 140 g, female 143 g. Adult shaggy-looking above, back and wings white-streaked brown, short orange-rufous crest, lower back white, tail blackish with broad whitish lateral area at base and at tip, central rectrices all dark except at base; whitish below, striped brown on throat and breast; bare facial skin yellow, iris yellow to orange, bill orange to yellow, feet bluish grey. Juvenile with small white spot on tips of remiges, bill black and white, iris light grey. Voice. Noisy, plaintive whistles, "pio...pio...pio...pr...prrr", also guttural calls, a high gargled trill, and a "creep".
Habitat. Second-growth scrub, drier tree and scrub savanna and scrub woodlands, pampas, pastures, coastal dunes. Groups huddle together on cold days and perch together in a tree at night. Roosts in trees. Sea-level to 1200+ m.
Food and Feeding. Insects, grasshoppers, cicadas, flying termites, frogs; eggs and nestlings of small birds; takes mice and rats in captivity. Gregarious, feeds on ground in flocks of up to 20 (mean group size 6-8).



Breeding. In Brazil, some nest in dry months May-Aug but mainly in rains during Aug-Nov near Brasília, also Aug-Nov near Rio de Janeiro; Nov-Dec in Uruguay and Argentina. Group-living; flocks decrease in size in spring, when some groups split into pairs to breed. Sometimes lays in nests of other species, including anis, and may incubate with the anis. Nest a large open platform of sticks, high in thorny tree; often renovates old nest from previous season. Eggs grey to turquoise with whitish chalky splotches and streaks raised in relief, variable within a nest; 28 x 37 mm, 25 g; a few nests have only one breeding pair, but in most

groups several females lay in the nest, average 10 eggs in a group nest (number of eggs greater in groups with more birds). Incubation 10-15 days; nestling pale-skinned, white hair-like down above, bill pale with black culmen ridge and mandibular rami, mouth-lining pale with raised papillae, black bar on tip of tongue; young leave nest by day 5 or 6 when disturbed, but typically fledge about day 15; 26% of eggs and 55% of hatchlings survive to fledging.
Movements. Resident. A vagrant (or escaped captive?) was found emaciated in Curaçao, though species unknown on the nearest mainland in Venezuela and Colombia.
Status and Conservation. Not globally threatened. Generally common. Has extended its range during the last 100 years, entering fields occupying deforested areas; common in Mato Grosso, SC Brazil, and also in E Bolivia; disappears with afforestation, and absent from forested parts of Amazonia. Has been bred in captivity, although the young may require hand-feeding.
Bibliography. Abrahamovich & Cicchino (1985), Belton (1984), Canevari *et al.* (1991), Cavalcanti *et al.* (1991), Chebez (1993), Contreras *et al.* (1990), Davis (1940b, 1942), Fandiño (1986, 1989), Fjeldså & Krabbe (1990), Gallardo (1984), Jenny (1997), Klimaitis & Moschione (1987), Laubmann (1930), Lückner (1995a), Macedo (1992, 1994), Mason (1985), Naumburg (1930), Nellar (1993), Olrog (1984), Pagei (1992), de la Peña (1988, 1996), Pinto (1964), Quinn *et al.* (1994), Reichholf (1974), do Rosário (1996), Rutgers & Norris (1972), Salvador (1981), Schubart *et al.* (1965), Short (1975), Sick (1985, 1993), Snethlage (1928), Souza (1995), Stotz *et al.* (1996), Waldrigues *et al.* (1983), Wetmore (1926).



Subfamily NEOMORPHINAE

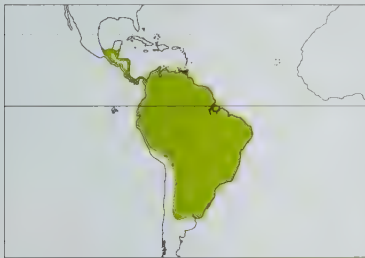
Genus *TAPERA* Thunberg, 1819

127. American Striped Cuckoo

Tapera naevia

French: Géocoucou tacheté **German:** Streifenkuckuck **Spanish:** Cuclillo Crespín
Other common names: Striped/Four-winged Cuckoo

Taxonomy. *Cuculus naevius* Linnaeus, 1766, Cayenne. Additional race *chochi* sometimes recognized for birds of S Brazil and N Argentina on basis of larger size and colour of upperparts, but these populations overlap considerably in size and plumage with birds in N Brazil and Venezuela. Two subspecies normally recognized.
Subspecies and Distribution. *T. n. excellens* (P. L. Sclater, 1858) - S Mexico to E Panama. *T. n. naevia* (Linnaeus, 1766) - Colombia E to the Guianas, and S to W Ecuador, N Peru and Brazil and on S to Bolivia, Paraguay and N Argentina; Margarita I (Venezuela) and Trinidad.



Descriptive notes. 26-29 cm; 52 g. Adult brown above, streaked buff and black, head with striped blackish and rufous crest, white supercilium and narrow black malar line, prominent black alula extended from wing; whitish below, sides of throat and chest with distinct black streaks, belly white; bare skin around eye yellow, iris brown to greenish, bill brown to orange-brown below, feet grey-brown. Juvenile more rufous, crown black with buff spots (not streaks), buff spots on back and upperwing-coverts, underparts buff with fine black bars, belly white with small dark spots (not streaks). Race *excellens* brighter, with

longer, deeper bill. **Voice.** Song 3-5 whistled notes, "pee-pee-pee-PEEdee". Call a mellow whistle, second note slightly higher, often repeated; differs regionally, whistle one syllable in NE Brazil, 3 syllables elsewhere in Brazil. Conspicuous when singing from post or wire.
Habitat. Second-growth scrub, low seasonally wet grassland, river-island scrub, open country with scattered trees, thickets and bushes, clearings in forested areas, brush at margins of tropical forests; sand-bathes along roadsides. Sea-level to 1500 m, occasionally to 2500 m in Venezuela.
Food and Feeding. Insects, especially grasshoppers, caterpillars: as with other parasitic cuckoos, young take whatever foster parents bring, including crickets, roaches, grasshoppers, caterpillars. Solitary, forages in vegetation and on ground; sways from side to side, fans the large alula perhaps to flush prey.
Breeding. Breeds Jun in S Mexico (Oaxaca), nearly all year in Surinam, nearly all year in French Guiana but sings most early in dry season. Brood-parasitic: hosts small birds with domed or covered nests, especially furnariid ovenbirds e.g. spinetails (*Synallaxis*, *Schoeniophylax*, *Certhiaxis*), wrens (*Thryothorus*), flycatchers (*Myiozetetes*), and sparrows (*Arremonops*). Enters nests at dawn, when adult hosts are foraging. Eggs white, pale blue or greenish blue; 22 x 17 mm; incubation 15-16 days (*Synallaxis* incubation 17-18 days). Eviction not described (closed nest may prevent eviction). Hatchling naked, pinkish, gape orange-yellow; within 24 hours uses sharp bill to kill host's chicks, which foster parent may remove; fledges in 18 days, remaining with foster parents for several more days.
Movements. Resident in most of range; seasonal in Argentina, where adults migrate from breeding area (Tucumán) earlier than the young.

Status and Conservation. Not globally threatened. A shy and solitary species, variably common to uncommon; call is one of typical sounds of areas of secondary growth in South America. Species has expanding range in the past 50 years, in response to deforestation in Central America and Brazil.
Bibliography. Bangs & Penard (1918), Belton (1984), Binford (1989), Canevari *et al.* (1991), Chebez (1993), Contreras *et al.* (1990), Dean (1971), Fjeldså & Krabbe (1990), Friedmann (1933), Haverschmidt (1955, 1961), Haverschmidt & Mees (1994), Hellmayr (1929), Herklots (1961), Hilty & Brown (1986), Howell & Webb (1995a), Kiff & Williams (1978), Klimaitis & Moschione (1987), Loetscher (1952), Marton & Farabaugh (1979), Meyer de Schauensee & Phelps (1978), Mitchell (1957), Monroe (1968), Morgensen (1927), Morton & Farabaugh (1979), Nellar (1993), de la Peña (1988, 1993, 1996), Pinto (1938), Ridgely & Gwynne (1989), do Rosário (1996), Salvador (1982), Schubart *et al.* (1965), Short (1975), Sick (1953a, 1981b, 1985, 1993), Slud (1964), Snyder (1966), Stiles & Skutch (1989), Stotz *et al.* (1996), Thomas (1979), Tostain *et al.* (1992), Wetmore (1926, 1968).

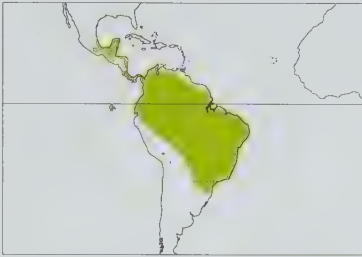
Genus *DROMOCOCCYX* Wied, 1832

128. Pheasant Cuckoo

Dromococcyx phasianellus

French: Géocoucou faisán **German:** Fasanenkuckuck **Spanish:** Cuclillo Faisán

Taxonomy. *Macropus phasianellus* Spix, 1824, Tonantins, north-west Brazil. Population of Mexico and Central America often recognized as race *ruficularis*, this being based on a bird in juvenile plumage; neither juveniles nor adults, however, differ between areas. Monotypic.
Distribution. S Mexico (Oaxaca) and Central America to Panama, Colombia, Venezuela, the Guianas, Ecuador, Brazil and Amazonian Peru then on to Bolivia, Paraguay and N Argentina.
Descriptive notes. 36 cm; 80 g. Adult small-headed, thin-necked, dark brown above with scaly feathers, short rufous crest, white eye-stripe, long graduated tail with white tip; whitish below,



breast whitish buff with dusky streaks; eye-ring yellow-green, iris brown to yellow, bill blackish above, paler below, feet greyish brown. Juvenile sooty-brown, finely spotted buff on blackish crown, wing-coverts with round buff apical spots, buff ends to flight-feathers and uppertail-coverts, breast rich buff and unmarked or with dusky spots, belly whitish. **Voice.** Melancholy whistles, "se-sée-werrrrr", final note quavering; also a 4-note series, "sah, seh, si-see", rising in pitch, and a series of rattling, clucking notes.
Habitat. Tropical lowland evergreen forest, flooded tropical evergreen forest, tropical decidu-

ous forest, thickets and undergrowth, low-altitude cloud forest, forest borders and secondary woodland, lake margins with grassy edges, thick viny growth, *Cecropia* and dying trees. Sea-level to 1600 m.
Food and Feeding. Insects, including large grasshoppers; lizards.
Breeding. Breeds Apr-Jun in Oaxaca. Brood-parasitic: hosts are birds laying in open or covered nests, include tyrannid flycatchers (*Rhynchocyclus brevirostris*, *Myiozetetes*, *Fluvicola pica*). Eggs dull white or pale buff, wreath of rufous spots at large end; 24 x 16 mm.
Movements. Unknown.

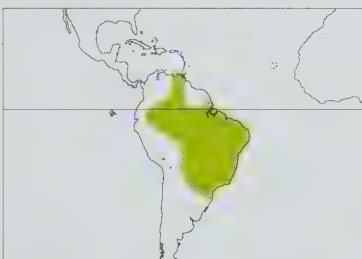
Status and Conservation. Not globally threatened. Widespread, but uncommon to rare and local; secretive and solitary behaviour make it difficult to assess numbers and relative abundance, but species is certainly not common. Disappeared from Barro Colorado I in Panama in 1971.
Bibliography. Belton (1984), Binford (1989), Canevari *et al.* (1991), Contreras (1993), Hayes (1995), Hellmayr (1929), Hilty & Brown (1986), Howell & Webb (1995a), Howell *et al.* (1992), Meyer de Schauensee & Phelps (1978), Monroe (1968), Naumburg (1930), de la Peña (1988), Ridgely & Gwynne (1989), Ridgway (1916), Rowley (1966), Saibene *et al.* (1996), Schönwetter (1967), Schubart *et al.* (1965), Sick (1953a, 1953b, 1985, 1993), Sieving (1990), Slud (1964), Stiles & Skutch (1989), Stotz *et al.* (1996), Terborgh *et al.* (1984), Wetmore (1968), Willis & Eisenmann (1979), Wilson (1992).

129. Pavonine Cuckoo

Dromococcyx pavoninus

French: Géocoucou pavonin **German:** Pfauenkuckuck **Spanish:** Cuclillo Pavonino

Taxonomy. *Dromococcyx pavoninus* Pelzeln, 1870, Araguay, Engenho do Gama and Arimani, Brazil. Monotypic.
Distribution. Venezuela and Guyana through E Ecuador, E Peru and Bolivia to Brazil (S to Mato Grosso, São Paulo and Rio de Janeiro), Paraguay and N Argentina (Misiones).



Descriptive notes. 28 cm; 48 g. Adult small-headed, thin-necked, dark above, with scaly feathers edged white on outer webs (frosted appearance), crown, face and short crest rufous, eye-stripe buff, cheek black, wings brown, coverts edged whitish, uppertail-coverts black with white tips, graduated tail brown with white tips and broad subterminal black band; unspotted rufous throat and breast, white belly; iris brown, bill black above, paler below, feet grey. Juvenile greyer, head grey-brown, white eye-stripe, back blackish with some buff-edged feathers, throat and breast greyish. **Voice.** Call a whistled "püü, pee, püü-pe-pe", first note lowest,

last note a half-tone higher.
Habitat. Lowland tropical evergreen forest, montane evergreen forest, scrub thickets, tangled forests with dense secondary woodland, heavy brush, transitional forest, seasonally inundated forest; occurs in areas with abundant *Heliconia* and *Ficus*. Lowlands to 1600 m, occasionally to 1900 m or more in Venezuela.
Food and Feeding. Insects. Forages on ground and in forest understorey.
Breeding. Brood-parasitic: hosts include species with closed or bag-shaped nests (Tyrannidae, Formicariidae). Eggs white with purplish spots; 21 x 15 mm. Host's young disappear after cuckoo hatches.
Movements. Resident.
Status and Conservation. Not globally threatened. A solitary cuckoo, uncommon to rare, not well known, and sensitive to habitat disturbance. Its distribution is patchy and discontinuous, though the species may be overlooked in some areas owing to its secretive habits.
Bibliography. Canevari *et al.* (1991), Chebez (1993), Gai (1949), Hayes (1995), Hilty & Brown (1986), Meyer de Schauensee & Phelps (1978), Neunteufel (1951), Olrog (1968, 1984), de la Peña (1988), Remsen & Traylor (1989), Saibene *et al.* (1996), Schönwetter (1967), Schubart *et al.* (1965), Short (1975), Sick (1953a, 1953b, 1985, 1993), Snyder (1966), Stotz *et al.* (1996), Terborgh *et al.* (1984).

Genus *MOROCOCCYX* P. L. Sclater, 1862

130. Lesser Ground-cuckoo

Morococcyx erythropygus

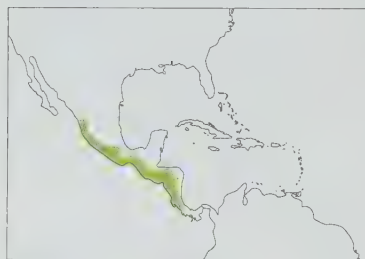
French: Géocoucou de Lesson **German:** Drosselkuckuck **Spanish:** Cuclillo Bobo
Other common names: Rufous-rumped Cuckoo

Taxonomy. *Coccyzus erythropyga* Lesson, 1842, San Carlos, Central America. Two subspecies recognized.

Subspecies and Distribution.

M. e. mexicanus Ridgway, 1915 - Pacific slope of tropical W Mexico from S Sinaloa S to Isthmus of Tehuantepec.

M. e. erythropygus (Lesson, 1842) - S Mexico (hills of Oaxaca on E side of Plains of Tehuantepec E to Chiapas) to NW Costa Rica, and also arid interior valleys on Caribbean slope of Guatemala and Honduras.



Descriptive notes. 25 cm; 62 g. Adult greyish brown above, with bronzy reflections on wings and long tail, rufous below; bare eye-ring and lores yellow, bare skin behind eye blue with black border, iris brown, bill yellow with black culmen, long legs yellow-brown. Juvenile duller above, scaled with pale feather edges, paler below, smudged dusky, bare orbital skin grey, bill brown above, lighter below. Race *erythropygus* larger and paler. **Voice.** A mellow whistle, "teecee"; a clear trilled whistled series with notes lower and more widely spaced, series introduced by 2-3 clear ascending whistles; also a growling "ghaaaoww"; female clacks mandibles.

Habitat. Arid lowland scrub, tropical deciduous forest edge in semi-arid scrub and woodland, thorny thickets on arid slopes. Sea-level to 1500 m, locally to 1800 m in Guatemala.

Food and Feeding. Insects, mainly grasshoppers. Forages in understorey, also on bare ground, at edges of cultivation; walks or hops among leaves on ground with chicken-like head and leg movements, picks food from ground or leaps to foliage; furtive, skulking, inquisitive, not shy.

Breeding. Breeds May in S Mexico (Oaxaca), Jul in Guatemala. Nest a shallow bowl of sticks and leaf petioles and rachises, lined with dead leaves, on ground. Eggs 2, chalky white or smooth white; 27 x 21 mm; incubation by both sexes, in spells of 2-4 hours at a time.

Movements. Resident.

Status and Conservation. Not globally threatened. Few details available, but species is reckoned to be generally fairly common, and habitat not thought to be under serious threat at present; species is locally common in Guanacaste, N Costa Rica.

Bibliography. Anon. (1983), Binford (1989), Davis (1972), Dearborn (1907), Edwards (1989), Howell & Webb (1995a), Land (1970), Monroe (1968), Ridgway (1916), Rowley (1984), Schaldach (1963), Skutch (1966, 1983), Slud (1964), Stiles & Skutch (1989), Stotz *et al.* (1996).

Genus *GEOCOCCYX* Wagler, 1831

131. Greater Roadrunner

Geococcyx californianus

French: Grand Géocoucou

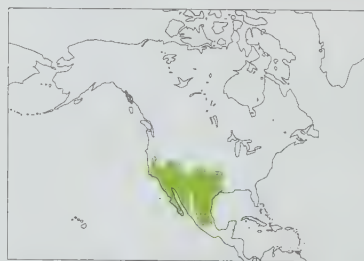
German: Wegekuckuck

Spanish: Correcaminos Grande

Taxonomy. *Saurothera californiana* Lesson, 1829, California.

Population from Texas (USA) S to Nuevo León and Veracruz (Mexico) averages smaller and has been described as race *dromicus*; but birds from this region overlap in size with those in other parts of range. Monotypic.

Distribution. SW USA and Mexico, from California, Utah and Colorado E inland to Missouri and Louisiana, through coastal Texas and Baja California, S to Michoacán, Puebla and Veracruz.



Descriptive notes. 56 cm; male 320 g, female 290 g. Large and slender, with long tail and long legs; streaked brown above with bronze gloss, shaggy blue-black crest, tail with broad white tips on outer 3 rectrices; whitish below with brown streaks; eye-ring blue, bare skin behind eye usually white (male) and orange, iris brown with yellow ring, bill blackish, feet grey. Female averages smaller, postorbital skin usually blue and orange. Juvenile duller, feather tips more pointed, with white U-shaped patches on tips of primary coverts; white tips of rectrices wedge-shaped, rather than oblong; postorbital skin as in adult female, inner iris develops grey ring around pupil, outer iris brown. **Voice.** Mournful dove-like "coo" notes, slow and descending in pitch; also a bill-rattle.

Habitat. Arid scrub, lowland or montane; widely dispersed in dry open country with scattered brush, mesquite, palo verde, creosote, cholla cactus, prickly pear cactus, upper oak and piñon pine scrub, in yucca and shortgrass plains of N Texas panhandle; also in tall pines and magnolias in E Texas; clearings in farms and dry scrubby woods. Roosts and feeds in shelter of trees and rocks. Mostly in arid and semi-arid regions having at least 140 clear sunny days from sunrise to sunset; N limit to range determined by prolonged deep snow cover. Occurs from lowlands up to 2500 m.

Food and Feeding. Opportunistic carnivore, taking: insects (grasshoppers, crickets, cicadas, caterpillars, beetles), scorpions, centipedes, spiders (including tarantulas), toads, lizards, small snakes (including rattlesnakes), small birds and eggs, mice, young ground squirrels, young rabbits, young bats fallen from cave ceilings, roadside carrion; also, up to 10% of diet made up of fruits and seeds, e.g. prickly pear (*Opuntia*) cactus, sumac (*Rhus integrifolia*). Terrestrial and cursorial, foraging solitary or in pairs; can fly, but usually runs on bare ground under cover; runs after prey on ground, leaps at flying insects, tosses and batters lizards and snakes against a stone, attacks scorpions by the tail; members of pair sometimes co-operate in attacking a snake.

Breeding. In S California, breeds from late Feb in low elevations of Lower Sonoran Life Zone, a month later in upland deserts of Upper Sonoran Life Zone; in S Arizona from mid-Apr to mid-Jun and late Jul to mid-Sept, with pause in hot dry summer and increased nesting after summer rains (varies with annual rains); in Texas breeds Mar-Oct, in Oklahoma Apr-Jul/Aug. Breeding male feeds mice, small birds, snakes and lizards to his mate. Nest is an open bulky platform of sticks, lined with leaves, snakeskins, dung and mesquite seed-pod debris; often placed in shade, 1-3 m up in bush, low tree, thicket or cactus clump. Eggs 2-6 (clutches larger after summer rains), white, 39 x 30 mm; laying interval often 2 days, but variable; incubation 17-18 days, by male at night and by both sexes in daytime, female having one

bout in morning and one in afternoon; hatching asynchronous, age differences of nestlings up to 7 days. Hatchling 14 g, nearly naked, skin black (throat whitish) with short (1-7 mm) whitish hair-like feather sheaths, gape flange pink, mouth red with white upper palate, raised area of white papillae on each side of palate and at base of throat, feet black; cared for by both parents; half adult weight at 14 days; when disturbed, nestlings give loud vocal "churr", also bill-rattle, and will also excrete a blackish foul-smelling liquid; fledging 17-19 days; young fed by adults for further 2 weeks; follow parents to feeding areas and catch their own food within 2-3 weeks. Pair can nest again a month after first nesting, male taking over care of fledglings while female lays second clutch; single-brooded, double-brooded or even triple-brooded, depending on weather. In Texas 73% of nests were robbed by predator, 22% of eggs survived to fledge, and a pair that nested twice could produce on average 3.5 chicks in a season; in another study, in New Mexico and Oklahoma, 66% of eggs laid hatched, 87% of nestlings fledged, and overall nest success was 72%.

Movements. Resident. Pair remains on territory all year and in successive years; one remained 5 years in the same site. A pair may sometimes move together to a new territory and reneest c. 1-6 km from an earlier nest, while other birds move independently of their mate, in both cases after failure of earlier nest. No evidence of seasonal movements. Juveniles thought to disperse from their natal territories.

Status and Conservation. Not globally threatened. Common to fairly common; population numbers over most of range have shown no significant change in period 1966-1993. Most numerous in SE California, S Arizona (Chihuahuan Desert) and Texas W of Pecos R and S of Edwards Plateau. Density on rocky slopes in S California 0.65 birds/km², lower in other desert habitats; in coastal S Texas 3 birds/km²; territories average 0.5 km². Adult annual survival at least 60% (few ringing recoveries). During 20th century, range has expanded N and E in California, E Kansas and Oklahoma, and across Ozarks into basin of Mississippi R; land clearance, overgrazing, and a later reinvasion of scrub may be involved in the eastern range expansions. On a more local scale, range is decreasing in urban areas (see page 545), where habitat is developed for agricultural and residential development, and the species has been extirpated in Central Valley and S counties of California. Has bred in captivity.

Bibliography. Baumgartner & Baumgartner (1992), Beal (1978, 1981), Beal & Gillam (1979), Bent (1940), Berger (1952, 1954), Binford (1971), Bleich (1975), Browning (1978), Bryant (1916), Calder (1967, 1968a, 1968b, 1968c), Calder & Bentley (1967), Calder & Schmidt-Nielsen (1967), Coues (1900), Dobie (1939), Dunson *et al.* (1976), Eltahir (1980), Emlen (1974), Engels (1938), Finley & Finley (1915), Folse (1974), Folse & Arnold (1976, 1978), Garland (1989), Garrett & Dunn (1981), Geluso (1969, 1970a, 1970b), Gorsuch (1932), Grinnell & Miller (1944), Harris & Crews (1983), Harrison (1978), Herreid (1960), Howell & Webb (1995a), Hughes (1996b), James & Neal (1986), Johnson (1979), Kaufman (1996), Kavanaugh & Ramos (1970), Kimsey (1953), Lasiewski *et al.* (1971), Lowe & Minde (1969), Mayhew (1971), McCaskie *et al.* (1988), Meinzer (1993), Miller & Stebbins (1964), Muller (1971), Oberholser (1974), Ohmart (1972, 1973, 1989), Ohmart & Lasiewski (1971), Ohmart, Chapman & McFarland (1970), Ohmart, McFarland & Morgan (1970), Pemberton (1916, 1925), Peterson (1980), Price *et al.* (1995), Pridgen (1995), Rand (1941b), Root (1988), Rutgers & Norris (1972), Schaafsma (1989), Sherbrooke (1990), Shetlar (1971), Shufeldt (1885, 1886a, 1886b, 1886c), Small (1994), Smith, M.H. (1981), Stotz *et al.* (1996), Sutton (1913, 1915, 1922, 1967, 1972), Tweit & Tweit (1986), Van Tyne & Sutton (1937), Vehrencamp (1982), Vehrencamp & Halpenny (1981), Weathers (1983), Whitson (1971, 1975, 1983), Wilbur (1987), Woods (1960), Zimmerman (1970).

132. Lesser Roadrunner

Geococcyx velox

French: Géocoucou véloce

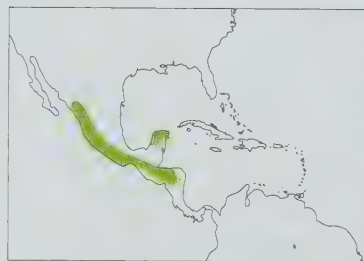
German: Rennkuckuck

Spanish: Correcaminos Chico

Taxonomy. *Cuculus velox* Wagner, 1836, Mexico.

Has on occasion been subdivided into as many as five races. Monotypic.

Distribution. W Mexico from S Sonora to Chiapas, on central plateau from Nayarit and Jalisco S to México, Morelos, Puebla, Veracruz and Oaxaca; also Yucatán, and Central America from Guatemala, El Salvador and Honduras to C Nicaragua.



Descriptive notes. 48 cm; 178 g. Adult crested and long-tailed, streaked brown above, buff below, sides of neck and breast streaked, undertail-coverts tan, darker than belly; bare skin behind eye blue, extending back to red patch, iris yellow to brown, tarsi grey-green. Juvenile with buff feather tips above, dark spots (not streaks) on breast, bare skin around eye blue (as adult). **Voice.** Call a soft "coo", about 1/sec, repeated on descending scale.

Habitat. Arid lowland scrub, arid montane scrub; dry open country with scattered brush, thorn scrub, grassy and lightly wooded hillsides, farmland. Sea-level to 2800 m, occasionally to 3000 m.

Food and Feeding. Insects, mainly grasshoppers and caterpillars. Foraging behaviour much as for *G. californianus*.

Breeding. Breeds in Mexico in Apr (Veracruz) and May-Jul (Oaxaca); Apr-May in Guatemala, Aug in El Salvador. Nest a bulky stick platform, built above ground in bushy tree, thorn bush or centre of an *Opuntia* cactus thicket. Eggs 2-3 (2-4), white; 35 x 26 mm.

Movements. Resident.

Status and Conservation. Not globally threatened. Few details available, but species is reckoned to be generally fairly common throughout its range; habitat not thought to be under serious threat at present.

Bibliography. Anon. (1983), Binford (1989), Blake & Hanson (1942), Dearborn (1907), Howell & Webb (1995a), Land (1970), Miller (1932), Monroe (1968), Moore (1934), Owen (1861), Rowley (1984), Schaldach (1963), Schönwetter (1967), Selander & Giller (1959), Short (1974), Stotz *et al.* (1996).

Genus *NEOMORPHUS* Gloger, 1827

133. Rufous-vented Ground-cuckoo

Neomorphus geoffroyi

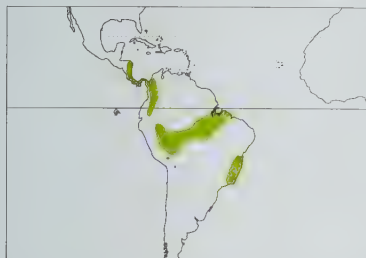
French: Géocoucou de Geoffroy

German: Geoffroykuckuck

Spanish: Cuco-hormiguero Ventrirrifo

Other common names: Scaled Ground-cuckoo (*squamiger*)

Taxonomy. *Coccyzus geoffroyi* Temminck, 1820, Pará, Brazil. Form *squamiger* may be better treated as a full species. Seven subspecies currently recognized.
Subspecies and Distribution.
N. g. salvini P. L. Sclater, 1866 - Nicaragua, Costa Rica, Panama and Pacific coast of Colombia.
N. g. aequatorialis Chapman, 1923 - SE Colombia, Ecuador and N Peru.
N. g. australis Carriker, 1935 - Peru and NW Bolivia.
N. g. geoffroyi (Temminck, 1820) - Brazil S of Amazon (Para).
N. g. squamiger Todd, 1925 - Brazil S of Amazon (lower R Tapajóz area).
N. g. maximiliani Pinto, 1962 - E Brazil (Bahia).
N. g. dulcis Sneath, 1927 - SE Brazil (Espírito Santo to Rio de Janeiro).



Descriptive notes. 50 cm; c. 340-349 g. Race *salvini* bronzy-brown above, glossed green on wings, crest black, forehead buff to cinnamon-brown, breast with dusky semicircular bands, narrow black band on chest, underparts buff with rufous vent; bare facial skin blue, iris brown, bill large, yellow-green, feet dark grey. Juvenile duller, darker, with loose fluffy plumage, blackish with rufous-grey on belly, little gloss on wings and tail, bill dark. Race *geoffroyi* darker olive-green above, with white barring on crown; *squamiger* with black band on chest indistinct; *australis* with crest unmarked; *dulcis* dark blue above; *maximiliani* dark bronze-green above with purplish tail; *aequatorialis* bronzy-green above, forehead warm brown, breast feathers with broad pale tips. Voice. Loud bill-clapping; soft dove-like moaning "ooooo-oóp", low "woof" at army-ant raids, and loud "kchak!" in feeding competition.

Habitat. Tropical lowland evergreen forests, high-ground forest, also transitional forest with seasonal inundations, in *Ficus* and *Heliconia*, canebrakes and thickets. Lowlands and foothills to 1200 m, to 1650 m in Bolivia.

Food and Feeding. Large insects, scorpions, centipedes, spiders, small frogs, lizards, occasionally seeds and fruit. Terrestrial, wary and agile; runs and can flutter to elevated perch but not seen to sustain flight. Looks into heaps of branches, armadillo holes, empty terrestrial-termite mounds; often forages at army-ant swarms, runs and bill-snaps at edges of ant raids, or tosses leaf litter, also follows peccaries; leaps over logs, dashes about on ground, flicks aside leaves and pecks at insects in litter, captures flushed arthropods in short runs along ground.

Breeding. Breeds in northern summer or wet season as far S as N Colombia, where oviduct egg in Apr; in southern summer in SE Brazil. Nest a broad shallow bowl of sticks, lined with green leaves added daily, built in dense swampy vegetation; fresh green leaves added during incubation. Lays 1 egg, yellowish white; 40 x 32 mm. Adults attend their fledged young away from nest.

Movements. Resident.

Status and Conservation. Not globally threatened. A rare and local, solitary species which requires large blocks of natural forest. Population density 0.25 pairs/100 ha in floodplain forest in Amazonian Peru. Like other ground-cuckoos, it is apparently unable to cross the large rivers, which are barriers to its dispersal; this is one of the first birds known to have disappeared from Barro Colorado I, Panama, after flooding separated it from the mainland forest. Race *squamiger*, sometimes reckoned to be a separate species, is considered near-threatened because of its restricted range. Populations of ground-cuckoos in S Brazil would also appear to be under threat, and are disappearing as a result of deforestation.

Bibliography. Griscom & Greenway (1941), Gyldenstolpe (1945), Haffer (1975, 1977a), Hilty & Brown (1986), Howell (1957), King (1978/79), Pinto (1962, 1964), Ridgely & Gwynne (1989), Robbins *et al.* (1985), Roth (1981), Schubart *et al.* (1965), Scott & Brooke (1985), Sick (1949, 1962, 1985, 1993), Sick & Teixeira (1979), Slud (1964), Stiles & Skutch (1989), Stotz *et al.* (1996), Terborgh, Fitzpatrick & Emmons (1984), Terborgh, Robinson *et al.* (1990), Wetmore (1968), Willis (1974, 1982), Willis & Eisenmann (1979).

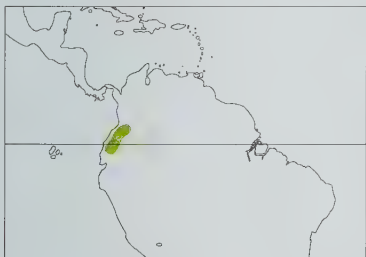
134. Banded Ground-cuckoo

Neomorphus radiolus

French: Géocoucou barré **German:** Bindengrunkuckuck **Spanish:** Cuco-hormiguero Escamoso

Taxonomy. *Neomorphus radiolus* P. L. Sclater and Salvin, 1878, Intac, Ecuador. Monotypic.

Distribution. Foothills of SW Colombia and NW Ecuador.



Descriptive notes. 50 cm. Adult large, black above and below, the feathers edged buffy white giving a striking scaly effect; crest black, wing-coverts chestnut, inner wing purplish red, outer primaries black, long tail black with purplish gloss; bare skin around eye blue, iris dark brown, bill heavy, dusky above, yellowish below, feet bluish grey. No information available on juvenile plumage. Voice. Unknown.

Habitat. Tropical lowland evergreen forest, in foothills and lower slopes on Pacific slope of W Andes. From 450 to 1525 m, mainly 500-1200 m.

Food and Feeding. Not described in detail.

Terrestrial; follows peccaries.

Breeding. No information.

Movements. Resident.

Status and Conservation. **ENDANGERED.** A rare and local, poorly known cuckoo, observed at a total of only 6 localities in SW Colombia (in Valle, Cauca, Nariño) and 6 in NW Ecuador (in

Esmeraldas, Imbabura, Pichincha). It is globally threatened owing to its fragmented and highly local populations, and also due to widespread forest destruction; only three records in Colombia since 1956, and a mere one in Ecuador since 1936 (in 1992). In 1990's, local hunters in Nariño reported it as fairly common but exceedingly shy. Sensitive to habitat disturbance. Biology virtually unknown.

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135. Rufous-winged Ground-cuckoo

Neomorphus rufipennis

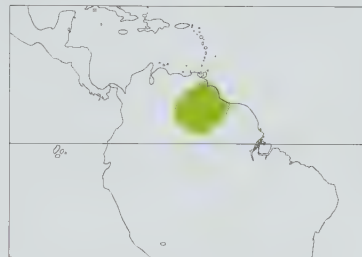
French: Géocoucou à ailes rousses

Spanish: Cuco-hormiguero Alirrufo

German: Rotschwingen-Grundkuckuck

Taxonomy. *Cultrides rufipennis* G. R. Gray, 1849, lower Orinoco River, Venezuela. Monotypic.

Distribution. S Venezuela, Guyana and N Brazil (Roraima, near upper R Branco).



Descriptive notes. 50 cm. Adult dark bronzy-green above, crest purplish-glossed black, head, neck and chest purplish blue-black, throat ashy-white to grey (black on some), dull grey-brown below, undertail-coverts grey, inner flight-feathers purplish red, primaries dark brown; bare skin on face red, iris red in male to brown in female, bill black with greenish tip, feet greenish grey to grey-blue. No information available on juvenile plumage. Voice. Single call a hoot, "whoó", repeated in no regular pattern, dove-like; also loud snapping of bill.

Habitat. Tropical lowland evergreen forest, including forest in highlands, in interior foot-

hill zone. Lowlands to 1100 m, possibly higher.

Food and Feeding. Diet not recorded, probably similar to that of congeners. Solitary, wary and restless, runs fast on ground, perches in middle branches of trees; often seen near bands of peccaries.

Breeding. Nest unknown. Eggs yellowish white; 40 x 31 mm.

Movements. Resident.

Status and Conservation. Not globally threatened. Like its congeners, this is a rare and poorly known species requiring further field research. Known to be sensitive to habitat disturbance.

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136. Red-billed Ground-cuckoo

Neomorphus pucheranii

French: Géocoucou de Pucheran

Spanish: Cuco-hormiguero Piquirrojo

German: Rotschnabel-Grundkuckuck

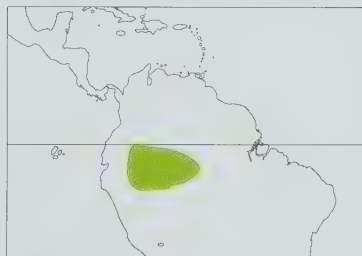
Taxonomy. *Cultrides Pucheranii* Deville, 1851, Rio Yaguas, Peru.

Two subspecies recognized.

Subspecies and Distribution.

N. p. pucheranii (Deville, 1851) - Amazonian Peru and W Brazil N of R Amazon.

N. p. lepidophanes Todd, 1925 - Amazonian Peru and W Brazil S of R Amazon.



Descriptive notes. 50 cm. Adult green-glossed brown above, crest black with purple gloss, wings rufous, outer primaries black, glossed violet, tail green-glossed purplish black; buffy below, throat grey, breast scaled black, black breast band, belly buffy to light grey; bare skin on face red, blue behind eye, bill red with yellow tip, feet dark grey. Juvenile plumage loose-webbed, unglossed brown above, crest blackish, wing dark brown, throat and breast blackish, belly brown, bill and feet black. Race *lepidophanes* with lower breast and belly clay colour. Voice. Calls include a roaring hum like a curassow (*Crax*); also a bill-snapping.

Habitat. Tropical lowland evergreen forest of upper Amazonia. Lowlands to 700 m.

Food and Feeding. Insects. Terrestrial; walks and runs on ground, leaps, regularly forages at army-ant swarms.

Breeding. Insufficient data. Nestling in Peru in Feb; buffy hair-like natal down attached to tip of growing contour feathers on head, bill black.

Movements. Resident.

Status and Conservation. Not globally threatened. A rare species, about which little is known. Not often seen. A reported sighting in S Colombia (Amazonas) indicates that its range may possibly be slightly larger than currently known. Sensitive to habitat disturbance.

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